

REDACTED VERSION

PRELIMINARY ASSESSMENT  
FOR  
Kennedy Heights  
Houston, Harris County, Texas

Prepared for:

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Deputy Project Officer  
Program Management Branch  
EPA - Region 6

Contract Number: 68-W6-0013



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recycled paper

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# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

Measurement Number: 01  
 Depth from LSD: -251.97 Measurement Date: 2/3/1970  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: 01  
 Depth from LSD: -247.43 Measurement Date: 12/8/1970  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: 01  
 Depth from LSD: -245.61 Measurement Date: 2/9/1971  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: 01  
 Depth from LSD: -249.49 Measurement Date: 6/8/1971  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: 01  
 Depth from LSD: -256.17 Measurement Date: 9/8/1971  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: 01  
 Depth from LSD: -256.16 Measurement Date: 2/1/1972  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: 01  
 Depth from LSD: -251.89 Measurement Date: 6/1/1972  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Steel Tape Measuring Agency: U.S. Geological Survey  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

Measurement Number: Not Reported  
 Depth from LSD: Not Reported Measurement Date: 9/19/1972  
 Visit Mark: Not publishable - water-level is not indicative of aquifer's piezometric surface or no measurement was obtained  
 Measurement Method: Not Reported Measuring Agency: U.S. Geological Survey  
 Remark: No measurement - well destroyed

### Infrequent Constituent Information::

Sample Number: 1 Storet Number: 01020  
 Sample Flag: Not Reported Sample Date: 7/22/1964  
 Constituent Value: 100. Confidence (+ or -): Not Reported  
 Storet Code Description: BORON, DISSOLVED (UG/L AS B)  
 Constituent Name: BORON Unit of Measurement: UG/L

Sample Number: 1 Storet Number: 01045  
 Sample Flag: Not Reported Sample Date: 7/22/1964  
 Constituent Value: 100. Confidence (+ or -): Not Reported  
 Storet Code Description: IRON, TOTAL (UG/L AS FE)  
 Constituent Name: IRON Unit of Measurement: UG/L

### Remarks:

100 ft of screen between 745 and 895 ft. Reported yield 599 gpm

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

### Water Quality Information::

Sample Number:	Not Reported	Sample Date:	7/22/1964
Temperature (C):	26	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Balanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	18.0
Calcium Flag:	Not Reported	Calcium MGL:	23.0
Magnesium Flag:	5	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	80.0
Potassium Flag:	Not Reported	Potassium MGL:	1.8
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	248.0
Sulfate Flag:	Not Reported	Sulfate MGL:	11.0
Chloride Flag:	Not Reported	Chloride MGL:	30.0
Fluoride Flag:	Not Reported	Fluoride MGL:	0.5
Nitrate Flag:	Not Reported	Nitrate Flag:	0.0
pH Flag:	Not Reported	pH:	7.5
Total Dissolved Fluids:	Not Reported	Total Hardness:	78
Phenol Alkalinity:	0.0	Total Alkalinity:	203.28
SAR:	3.94	RSC:	2.5
Specific Conductance:	492	Spec. Conductance Flag:	Not Reported
Percent Sodium:	68		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN, NOT AVAILABLE, OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

### Water Level Information::

Measurement Number:	01	Measurement Date:	8/0/1958
Depth from LSD:	-190.0	Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface
Measurement Method:	Unknown	Measuring Agency:	Registered Water Well Driller
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		
Measurement Number:	01	Measurement Date:	6/16/1966
Depth from LSD:	-225.44	Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface
Measurement Method:	Steel Tape	Measuring Agency:	U.S. Geological Survey
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		
Measurement Number:	01	Measurement Date:	9/22/1966
Depth from LSD:	-231.28	Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface
Measurement Method:	Steel Tape	Measuring Agency:	U.S. Geological Survey
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		
Measurement Number:	01	Measurement Date:	2/16/1967
Depth from LSD:	-233.79	Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface
Measurement Method:	Steel Tape	Measuring Agency:	U.S. Geological Survey
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		
Measurement Number:	01	Measurement Date:	2/19/1969
Depth from LSD:	-241.86	Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface
Measurement Method:	Steel Tape	Measuring Agency:	U.S. Geological Survey
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		
Measurement Number:	01	Measurement Date:	12/8/1969
Depth from LSD:	-250.19	Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface
Measurement Method:	Steel Tape	Measuring Agency:	U.S. Geological Survey
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

### Infrequent Constituent Information::

Sample Number:	1	Storet Number:	01020
Sample Flag:	Not Reported	Sample Date:	7/21/1964
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	BORON, DISSOLVED (UG/L AS B)		
Constituent Name:	BORON	Unit of Measurement:	UG/L
Sample Number:	1	Storet Number:	01045
Sample Flag:	Not Reported	Sample Date:	7/21/1964
Constituent Value:	200.	Confidence (+ or -):	Not Reported
Storet Code Description:	IRON, TOTAL (UG/L AS FE)		
Constituent Name:	IRON	Unit of Measurement:	UG/L

### Remarks:

90 ft of screen between 560 and 860 ft. Reported yield 363 gpm with 25 ft drawdown when drilled. Well 1.

Distance from TP:	1/2 - 1 Mile ENE	Longitude:	(b) (9)
Well Number:	6522702	Previous Well Number:	Not Reported
Owner:	City of Houston District No.43	County:	Harris
Driller:	Layne Texas	Region Number:	8
Basin:	San Jacinto River	Users Code Economics:	396200
Accuracy of Coordinates:	Not Reported	Elevation Method:	METHOD UNKNOWN
Latitude:	(b) (9)	Well Type:	Withdrawal of Water
Info Source:	Texas Water Development Board	Source of Depth Data:	Not Reported
FIPS County Code:	201	Type of Power:	Not Reported
Zone:	1	Tertiary Water Use:	Not Reported
Aquifer Code:	121EVGL	Secondary Water Use:	Not Reported
Ground Elevation AMSL:	43	Construction Method:	Not Reported
Date Drilled:	1958	Lithological Log Type:	Not Reported
Well Depth (ft):	907	Screen Material:	Not Reported
Type of Lift:	Turbine Pump	Interpretation Date:	Not Reported
Horsepower:	Not Reported	Level Data Available:	Historical water-level observation well
Primary Water Use:	Public Supply	Reporting Agency:	Not Reported
Well Schedule in file:	Not Reported		
Method of Finish:	Not Reported		
Casing Material:	Not Reported		
Lithological Interpreter:	Not Reported		
Qty Analysis Available:	Yes		
Data Collection Date:	Not Reported		
Water Logs Available:	Not Reported		
Other Data Available:	Not Reported		
Aquifer:	EVANGELINE AQUIFER		

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

### Water Quality Information::

Sample Number:	Not Reported	Sample Date:	10/21/1950
Temperature (C):	24	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Unbalanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	18.0
Calcium Flag:	Not Reported	Calcium MGL:	40.0
Magnesium Flag:	1	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	52.0
Potassium Flag:	Not Reported	Potassium MGL:	Not Reported
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	243.0
Sulfate Flag:	Not Reported	Sulfate MGL:	16.0
Chloride Flag:	Not Reported	Chloride MGL:	28.0
Fluoride Flag:	Not Reported	Fluoride MGL:	Not Reported
Nitrate Flag:	Not Reported	Nitrate Flag:	0.0
pH Flag:	Not Reported	pH:	7.5
Total Dissolved Fluids:	Not Reported	Total Hardness:	141
Phenol Alkalinity:	0.0	Total Alkalinity:	199.18
SAR:	1.91	RSC:	1.16
Specific Conductance:	491	Spec. Conductance Flag:	Not Reported
Percent Sodium:	44		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN, NOT AVAILABLE, OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

Sample Number:	Not Reported	Sample Date:	7/21/1964
Temperature (C):	24	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Balanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	19.0
Calcium Flag:	Not Reported	Calcium MGL:	42.0
Magnesium Flag:	8	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	55.0
Potassium Flag:	Not Reported	Potassium MGL:	1.8
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	252.0
Sulfate Flag:	Not Reported	Sulfate MGL:	16.0
Chloride Flag:	Not Reported	Chloride MGL:	27.0
Fluoride Flag:	Not Reported	Fluoride MGL:	0.4
Nitrate Flag:	Not Reported	Nitrate Flag:	0.0
pH Flag:	Not Reported	pH:	7.2
Total Dissolved Fluids:	Not Reported	Total Hardness:	136
Phenol Alkalinity:	0.0	Total Alkalinity:	206.56
SAR:	2.04	RSC:	1.37
Specific Conductance:	494	Spec. Conductance Flag:	Not Reported
Percent Sodium:	46		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN, NOT AVAILABLE, OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

### Water Level Information::

Measurement Number:	01	Measurement Date:	10/19/1950
Depth from LSD:	-127.0		
Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface		
Measurement Method:	Unknown	Measuring Agency:	Registered Water Well Driller
Remark:	MEASUREMENT GOOD, NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

### Infrequent Constituent Information::

Sample Number:	1	Storet Number:	01020
Sample Flag:	Not Reported	Sample Date:	7/21/1964
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	BORON, DISSOLVED (UG/L AS B)		
Constituent Name:	BORON	Unit of Measurement:	UG/L
Sample Number:	1	Storet Number:	01045
Sample Flag:	Not Reported	Sample Date:	7/21/1964
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	IRON, TOTAL (UG/L AS FE)		
Constituent Name:	IRON	Unit of Measurement:	UG/L

### Remarks:

170 ft of screen between 550 and 960 ft. Reported yield 1059 gpm  
with 64 ft drawdwib when drilled.

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Distance from TP:	1/2 - 1 Mile North		
Well Number:	6522705		
Owner:	City of Houston Chocolate Bayou Estate		
Driller:	Layne Texas		
Basin:	San Jacinto River		
Accuracy of Coordinates:	Taken from center of 2 1/2 min quadrangle based on state well number		
Latitude:	952115	Longitude:	293845
Info Source:	Texas Water Development Board	Previous Well Number:	Not Reported
FIPS County Code:	201	County:	Harris
Zone:	1	Region Number:	8
Aquifer Code:	112CEVG	Users Code Economics:	396200
Ground Elevation AMSL:	46	Elevation Method:	METHOD UNKNOWN
Date Drilled:	1950	Well Type:	Withdrawal of Water
Well Depth (ft):	874	Source of Depth Data:	Not Reported
Type of Lift:	None	Type of Power:	NO POWER SOURCE
Horsepower:	Not Reported	Tertiary Water Use:	Not Reported
Primary Water Use:	Unused	Secondary Water Use:	Not Reported
Well Schedule in file:	Not Reported	Construction Method:	Not Reported
Method of Finish:	Not Reported	Lithological Log Type:	Not Reported
Casing Material:	Not Reported	Screen Material:	Not Reported
Lithological Interpreter:	Not Reported	Interpretation Date:	Not Reported
Qty Analysis Available:	Yes	Level Data Available:	Miscellaneous water-level measurements
Data Collection Date:	Not Reported	Reporting Agency:	Not Reported
Water Logs Available:	Not Reported		
Other Data Available:	Not Reported		
Aquifer:	CHICOT AND EVANGELINE AQUIFERS		

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

Distance from TP: 1/2 - 1 Mile North  
 Well Number: 6522701  
 Owner: City of Houston District #44  
 Driller: Texas Water Wells  
 Basin: San Jacinto River  
 Accuracy of Coordinates: Taken from center of 2 1/2 min quadrangle based on state well number  
 Latitude: (b) (9) Longitude: (b) (9)  
 Info Source: Texas Water Development Board Previous Well Number: Not Reported  
 FIPS County Code: 201 County: Harris  
 Zone: 1 Region Number: 8  
 Aquifer Code: 112CEVG Users Code Economics: 396200  
 Ground Elevation AMSL: 48 Elevation Method: METHOD UNKNOWN  
 Date Drilled: 1955 Well Type: Withdrawal of Water  
 Well Depth (ft): 970 Source of Depth Data: Not Reported  
 Type of Lift: Turbine Pump Type of Power: Not Reported  
 Horsepower: 100 Tertiary Water Use: Not Reported  
 Primary Water Use: Public Supply Secondary Water Use: Not Reported  
 Well Schedule in file: Not Reported Construction Method: Not Reported  
 Method of Finish: Not Reported Lithological Log Type: Not Reported  
 Casing Material: Not Reported Screen Material: Not Reported  
 Lithological Interpreter: Not Reported Interpretation Date: Not Reported  
 Qlty Analysis Available: Yes Level Data Available: Miscellaneous water-level measurements  
 Data Collection Date: Not Reported Reporting Agency: Not Reported  
 Water Logs Available: Not Reported  
 Other Data Available: Not Reported  
 Aquifer: CHICOT AND EVANGELINE AQUIFERS

### Water Quality Information::

Sample Number:	Not Reported	Sample Date:	7/21/1964
Temperature (C):	Not Reported	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Balanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	19.0
Calcium Flag:	Not Reported	Calcium MGL:	36.0
Magnesium Flag:	7	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	67.0
Potassium Flag:	Not Reported	Potassium MGL:	2.0
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	262.0
Sulfate Flag:	Not Reported	Sulfate MGL:	4.0
Chloride Flag:	Not Reported	Chloride MGL:	32.0
Fluoride Flag:	Not Reported	Fluoride MGL:	0.4
Nitrate Flag:	Not Reported	Nitrate Flag:	0.5
pH Flag:	Not Reported	pH:	7.0
Total Dissolved Fluids:	Not Reported	Total Hardness:	117
Phenol Alkalinity:	0.0	Total Alkalinity:	214.75
SAR:	2.68	RSC:	1.92
Specific Conductance:	507	Spec. Conductance Flag:	Not Reported
Percent Sodium:	54		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN, NOT AVAILABLE, OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

### Water Level Information::

Measurement Number: 01  
 Depth from LSD: -159.0 Measurement Date: 9/12/1955  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Unknown Measuring Agency: Registered Water Well Driller  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

### Water Quality Information::

Sample Number:	Not Reported	Sample Date:	7/22/1964
Temperature (C):	24	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Balanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	18.0
Calcium Flag:	Not Reported	Calcium MGL:	39.0
Magnesium Flag:	7	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	58.0
Potassium Flag:	Not Reported	Potassium MGL:	1.8
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	248.0
Sulfate Flag:	Not Reported	Sulfate MGL:	13.0
Chloride Flag:	Not Reported	Chloride MGL:	30.0
Fluoride Flag:	Not Reported	Fluoride MGL:	0.4
Nitrate Flag:	Not Reported	Nitrate Flag:	0.0
pH Flag:	Not Reported	pH:	7.8
Total Dissolved Fluids:	Not Reported	Total Hardness:	128
Phenol Alkalinity:	0.0	Total Alkalinity:	203.28
SAR:	2.25	RSC:	1.54
Specific Conductance:	487	Spec. Conductance Flag:	Not Reported
Percent Sodium:	49		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN. NOT AVAILABLE. OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

### Water Level Information::

Measurement Number:	01	Measurement Date:	9/19/1957
Depth from LSD:	-178.0		
Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface		
Measurement Method:	Unknown	Measuring Agency:	Registered Water Well Driller
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		

### Infrequent Constituent Information::

Sample Number:	1	Storet Number:	01020
Sample Flag:	Not Reported	Sample Date:	7/22/1964
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	BORON. DISSOLVED (UG/L AS B)		
Constituent Name:	BORON	Unit of Measurement:	UG/L
Sample Number:	1	Storet Number:	01045
Sample Flag:	Not Reported	Sample Date:	7/22/1964
Constituent Value:	400.	Confidence (+ or -):	Not Reported
Storet Code Description:	IRON. TOTAL (UG/L AS FE)		
Constituent Name:	IRON	Unit of Measurement:	UG/L

### Remarks:

170 ft of screen between 535 and 880 ft. Reported yield 1001 gpm with 45 ft drawdown when drilled. Well 2.

**GEOCHECK VERSION 2.1**  
**STATE DATABASE WELL INFORMATION**

**Infrequent Constituent Information::**

Sample Number:	1	Storet Number:	01045
Sample Flag:	Not Reported	Sample Date:	4/9/1954
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	IRON, TOTAL (UG/L AS FE)		
Constituent Name:	IRON	Unit of Measurement:	UG/L

**Remarks:**

60 ft of screen between 465 and 585 ft. Reported yield 239 gpm  
with 35 ft drawdown when drilled.

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Distance from TP:	1/2 - 1 Mile North		
Well Number:	6522706		
Owner:	City of Houston District #44		
Driller:	Texas Water Wells		
Basin:	San Jacinto River		
Accuracy of Coordinates:	Taken from center of 2 1/2 min quadrangle based on state well number		
Latitude:	(b) (9)	Longitude:	(b) (9)
Info Source:	Texas Water Development Board	Previous Well Number:	Not Reported
FIPS County Code:	201	County:	Harris
Zone:	1	Region Number:	8
Aquifer Code:	112CEVG	Users Code Economics:	396200
Ground Elevation AMSL:	44	Elevation Method:	METHOD UNKNOWN
Date Drilled:	1957	Well Type:	Withdrawal of Water
Well Depth (ft):	890	Source of Depth Data:	Not Reported
Type of Lift:	Turbine Pump	Type of Power:	Not Reported
Horsepower:	100	Tertiary Water Use:	Not Reported
Primary Water Use:	Public Supply	Secondary Water Use:	Not Reported
Well Schedule in file:	Not Reported	Construction Method:	Not Reported
Method of Finish:	Not Reported	Lithological Log Type:	Not Reported
Casing Material:	Not Reported	Screen Material:	Not Reported
Lithological Interpreter:	Not Reported	Interpretation Date:	Not Reported
Qty Analysis Available:	Yes	Level Data Available:	Miscellaneous water-level measurements
Data Collection Date:	Not Reported	Reporting Agency:	Not Reported
Water Logs Available:	Not Reported		
Other Data Available:	Not Reported		
Aquifer:	CHICOT AND EVANGELINE AQUIFERS		

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

Distance from TP: 1/2 + 1 Mile North  
 Well Number: 6522712  
 Owner: City of Houston Scottcrest Subdivision  
 Driller: Layne Texas  
 Basin: San Jacinto River  
 Accuracy of Coordinates: Taken from center of 2 1/2 min quadrangle based on state well number  
 Latitude: 952115 Longitude: 293845  
 Info Source: Texas Water Development Board Previous Well Number: Not Reported  
 FIPS County Code: 201 County: Harris  
 Zone: 1 Region Number: 8  
 Aquifer Code: 112CHCTL Users Code Economics: 396200  
 Ground Elevation AMSL: 47 Elevation Method: METHOD UNKNOWN  
 Date Drilled: 1954 Well Type: Withdrawal of Water  
 Well Depth (ft): 600 Source of Depth Data: Not Reported  
 Type of Lift: None Type of Power: NO POWER SOURCE  
 Horsepower: Not Reported Tertiary Water Use: Not Reported  
 Primary Water Use: Unused Secondary Water Use: Not Reported  
 Well Schedule in file: Not Reported Construction Method: Not Reported  
 Method of Finish: Not Reported Lithological Log Type: Not Reported  
 Casing Material: Not Reported Screen Material: Not Reported  
 Lithological Interpreter: Not Reported Interpretation Date: Not Reported  
 Qlty Analysis Available: Yes Level Data Available: Miscellaneous water-level measurements  
 Data Collection Date: Not Reported Reporting Agency: Not Reported  
 Water Logs Available: Not Reported  
 Other Data Available: Not Reported  
 Aquifer: CHICOT AQUIFER, LOWER

### Water Quality Information::

Sample Number:	Not Reported	Sample Date:	4/9/1954
Temperature (C):	Not Reported	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Unbalanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	11.0
Calcium Flag:	Not Reported	Calcium MGL:	50.0
Magnesium Flag:	9	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	53.0
Potassium Flag:	Not Reported	Potassium MGL:	Not Reported
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	268.0
Sulfate Flag:	Not Reported	Sulfate MGL:	11.0
Chloride Flag:	Not Reported	Chloride MGL:	32.0
Fluoride Flag:	Not Reported	Fluoride MGL:	Not Reported
Nitrate Flag:	Not Reported	Nitrate Flag:	Not Reported
pH Flag:	Not Reported	pH:	7.5
Total Dissolved Fluids:	Not Reported	Total Hardness:	162
Phenol Alkalinity:	0.0	Total Alkalinity:	219.67
SAR:	1.81	RSC:	1.15
Specific Conductance:	Not Reported	Spec. Conductance Flag:	Not Reported
Percent Sodium:	41		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN, NOT AVAILABLE, OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

### Water Level Information::

Measurement Number: 01  
 Depth from LSD: -138.0 Measurement Date: 9/9/1954  
 Visit Mark: Publishable - water-level is indicative of aquifer's piezometric surface  
 Measurement Method: Unknown Measuring Agency: Registered Water Well Driller  
 Remark: MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE

**GEOCHECK VERSION 2.1**  
**STATE DATABASE WELL INFORMATION**

**Water Quality Information::**

Sample Number:	Not Reported	Sample Date:	7/21/1964
Temperature (C):	24	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Balanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	20.0
Calcium Flag:	Not Reported	Calcium MGL:	48.0
Magnesium Flag:	8	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	48.0
Potassium Flag:	Not Reported	Potassium MGL:	1.9
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	262.0
Sulfate Flag:	Not Reported	Sulfate MGL:	5.0
Chloride Flag:	Not Reported	Chloride MGL:	28.0
Fluoride Flag:	Not Reported	Fluoride MGL:	0.3
Nitrate Flag:	Not Reported	Nitrate Flag:	2.2
pH Flag:	Not Reported	pH:	7.1
Total Dissolved Fluids:	Not Reported	Total Hardness:	154
Phenol Alkalinity:	0.0	Total Alkalinity:	214.75
SAR:	1.69	RSC:	1.24
Specific Conductance:	491	Spec. Conductance Flag:	Not Reported
Percent Sodium:	40		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN. NOT AVAILABLE. OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

**Water Level Information::**

Measurement Number:	01	Measurement Date:	9/4/1950
Depth from LSD:	-110.0	Visit Mark:	Publishable - water level is indicative of aquifer's piezometric surface
Measurement Method:	Unknown	Measuring Agency:	Registered Water Well Driller
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		

**Infrequent Constituent Information::**

Sample Number:	1	Storet Number:	01020
Sample Flag:	Not Reported	Sample Date:	7/21/1964
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	BORON, DISSOLVED (UG/L AS B)		
Constituent Name:	BORON	Unit of Measurement:	UG/L
Sample Number:	1	Storet Number:	01045
Sample Flag:	Not Reported	Sample Date:	7/21/1964
Constituent Value:	200.	Confidence (+ or -):	Not Reported
Storet Code Description:	IRON, TOTAL (UG/L AS FE)		
Constituent Name:	IRON	Unit of Measurement:	UG/L

**Remarks:**

75 ft of screen between 471 and 569 ft. Reported yield 250 gpm  
53 ft drawdown when drilled.

# GEOCHECK VERSION 2.1

## STATE DATABASE WELL INFORMATION

### Infrequent Constituent Information:

Sample Number:	1	Storet Number:	01045
Sample Flag:	Not Reported	Sample Date:	6/29/1954
Constituent Value:	100.	Confidence (+ or -):	Not Reported
Storet Code Description:	IRON. TOTAL (UG/L AS FE)		
Constituent Name:	IRON	Unit of Measurement:	UG/L

### Remarks:

101 ft of screen between 684 and 845 ft. Reported yield 420 gpm with  
with 38 ft drawdown when drilled.

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Distance from TP:	1/2 - 1 Mile North		
Well Number:	6522708		
Owner:	City of Houston Sunnyside Addition		
Driller:	Not Reported		
Basin:	San Jacinto River		
Accuracy of Coordinates:	Taken from center of 2 1/2 min quadrangle based on state well number		
Latitude:	(b) (9)	Longitude:	(b) (9)
Info Source:	Texas Water Development Board	Previous Well Number:	Not Reported
FIPS County Code:	201	County:	Harris
Zone:	1	Region Number:	8
Aquifer Code:	112CHCTL	Users Code Economics:	396200
Ground Elevation AMSL:	46	Elevation Method:	METHOD UNKNOWN
Date Drilled:	1950	Well Type:	Withdrawal of Water
Well Depth (ft):	578	Source of Depth Data:	Not Reported
Type of Lift:	Turbine Pump	Type of Power:	Not Reported
Horsepower:	25	Tertiary Water Use:	Not Reported
Primary Water Use:	Public Supply	Secondary Water Use:	Not Reported
Well Schedule in file:	Not Reported	Construction Method:	Not Reported
Method of Finish:	Not Reported	Lithological Log Type:	Not Reported
Casing Material:	Not Reported	Screen Material:	Not Reported
Lithological Interpreter:	Not Reported	Interpretation Date:	Not Reported
Qty Analysis Available:	Yes	Level Data Available:	Miscellaneous water-level measurements
Data Collection Date:	Not Reported	Reporting Agency:	Not Reported
Water Logs Available:	Not Reported		
Other Data Available:	Not Reported		
Aquifer:	CHICOT AQUIFER.LOWER		

# GEOCHECK VERSION 2.1 ADDENDUM

## STATE DATABASE WELL INFORMATION

### Water Well Information:

Distance from TP:	1/2 - 1 Mile North		
Well Number:	6522707		
Owner:	City of Houston District #44		
Driller:	Layne Texas		
Basin:	San Jacinto River		
Accuracy of Coordinates:	Taken from center of 2 1/2 min quadrangle based on state well number		
Latitude:	952115	Longitude:	293845
Info Source:	Texas Water Development Board	Previous Well Number:	Not Reported
FIPS County Code:	201	County:	Harris
Zone:	1	Region Number:	8
Aquifer Code:	121EVGL	Users Code Economics:	396200
Ground Elevation AMSL:	45	Elevation Method:	METHOD UNKNOWN
Date Drilled:	1954	Well Type:	Withdrawal of Water
Well Depth (ft):	872	Source of Depth Data:	Not Reported
Type of Lift:	Turbine Pump	Type of Power:	Not Reported
Horsepower:	25	Tertiary Water Use:	Not Reported
Primary Water Use:	Industrial	Secondary Water Use:	Not Reported
Well Schedule in file:	Not Reported	Construction Method:	Not Reported
Method of Finish:	Not Reported	Lithological Log Type:	Not Reported
Casing Material:	Not Reported	Screen Material:	Not Reported
Lithological Interpreter:	Not Reported	Interpretation Date:	Not Reported
Qlty Analysis Available:	Yes	Level Data Available:	Miscellaneous water-level measurements
Data Collection Date:	Not Reported	Reporting Agency:	Not Reported
Water Logs Available:	Not Reported		
Other Data Available:	Not Reported		
Aquifer:	EVANGELINE AQUIFER		

### Water Quality Information::

Sample Number:	Not Reported	Sample Date:	6/29/1954
Temperature (C):	Not Reported	Sampled Aquifer Code:	Not Reported
Top of sampled interval:	Not Reported	Bottom of sampled interval:	Not Reported
Balanced/unbal Analysis:	Unbalanced	Collection Agency:	Not Reported
Silica Flag:	Not Reported	Silica MGL:	11.0
Calcium Flag:	Not Reported	Calcium MGL:	28.0
Magnesium Flag:	6	Magnesium MGL:	Not Reported
Sodium Flag:	Not Reported	Sodium MGL:	85.0
Potassium Flag:	Not Reported	Potassium MGL:	Not Reported
Strontium Flag:	Not Reported	Strontium MGL:	Not Reported
Carbonate MGL:	0.0	Bicarbonate MGL:	261.0
Sulfate Flag:	Not Reported	Sulfate MGL:	7.0
Chloride Flag:	Not Reported	Chloride MGL:	40.0
Fluoride Flag:	Not Reported	Fluoride MGL:	Not Reported
Nitrate Flag:	Not Reported	Nitrate Flag:	Not Reported
pH Flag:	Not Reported	pH:	7.8
Total Dissolved Fluids:	Not Reported	Total Hardness:	94
Phenol Alkalinity:	0.0	Total Alkalinity:	213.93
SAR:	3.8	RSC:	2.38
Specific Conductance:	Not Reported	Spec. Conductance Flag:	Not Reported
Percent Sodium:	66		
Collection Remark:	Not Reported		
Reliability Remark:	RELIABILITY UNKNOWN. NOT AVAILABLE. OR NOT YET ENTERED INTO DATABASE		
Lab Name:	Not Reported		

### Water Level Information::

Measurement Number:	01	Measurement Date:	6/28/1954
Depth from LSD:	-154.0		
Visit Mark:	Publishable - water-level is indicative of aquifer's piezometric surface		
Measurement Method:	Unknown	Measuring Agency:	Registered Water Well Driller
Remark:	MEASUREMENT GOOD. NO UNUSUAL CONDITIONS NOTED AT OR NEAR WELL SITE		

## ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
HOUSTON	S101711976	ON US290,4.8M NW HOUSTON CITY LIMITS,7.5M S	ON US290,4.8M NW HOUSTON CITY LIMITS,7.5M SE CYPRESS		SWF/LP	
HOUSTON	S102508514	WESLAYAN PLAZA WEST SHOPPING CENTER	WESLAYAN AT BISSONNET		TX VCP	

## ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
HOUSTON	U001542939	TEXAS OXYGEN	12430 HEMPSTEAD HWY		UST	0065013
HOUSTON	U001962586	REX AUTO REPAIR	14720 1/2 HEMPSTEAD HWY		UST	0065701
HOUSTON	U001277386	COASTAL HOBBY REFUELER	HOBBY AIRPORT	77051	UST	0045867
HOUSTON	S102508534	NORTHWAY PARK II	4845-4849 HOMESTEAD RD/ 6868 N LOOP E.		TX VCP	
HOUSTON	S102508634	KIRKWOOD COUNTRY (CHILSSINGTON)	NE INTERSECTION BISSONNET / S. KIRKWOOD		TX VCP	
HOUSTON	S102508547	NILS BEFELDT VOLVO DEALERSHIP	11451 KATY FWY		TX VCP	
HOUSTON	S102520386	FAS1 SEVEN FOOD STORE	4666 SOUTH LOOP E	77033	LUST	
HOUSTON	U001293064		9206 MARTIN LUTHER KING	77048	UST	0063607
HOUSTON	U003040864	STOP N GO #2586	11402 MARTIN LUTHER KING	77048	UST	0035223
HOUSTON	S101713054	0.5 MILES N OF THE INTERCHANGE OF LOOP 6	0.5 MILES N OF THE INTERCHANGE OF LOOP 610 / HWY 2		SWF/LF	
HOUSTON	S101713056	2 MILES SOUTH SOUTHWEST OF THE LOOP 610	2 MILES SOUTH SOUTHWEST OF THE LOOP 610 HWY 288 IN		SWF/LF	
HOUSTON	S102508554	WEST JUNCTION SHOPPING CENTER	NEC HIGHWAY 6 AND KEITH HARROW DRIVE		TX VCP	
HOUSTON	S101711958	N OF WESTPARK DR, S OF US 59, .4M W OF C	N OF WESTPARK DR, S OF US 59, .4M W OF CHIMNEY ROC		SWF/LF	
HOUSTON	S101711152	N OF US 90,S OF LEY RD,.9M E FM 527 IN H	N OF US 90,S OF LEY RD,.9M E FM 527 IN HOUSTON CIT		SWF/LF	
HOUSTON	S101711425	S OF BOUDREAUX RD., 2500'SW OF FM 2920,	S OF BOUDREAUX RD., 2500'SW OF FM 2920, NW OF HOOK		SWF/LF	
HOUSTON	S101711041	E OF ANAGNOST RD	E OF ANAGNOST RD		SWF/LF	
HOUSTON	S101712500	NORTH OF TANNER ROAD, BETWEEN CRAWFORD S	NORTH OF TANNER ROAD, BETWEEN CRAWFORD ST / DANC		SWF/LF	
HOUSTON	S101712087	E OF S EXIT PETRO LA S HOLMES RD .4M N	E OF S EXIT PETRO LA S HOLMES RD .4M N WUTHERING		SWF/LF	
HOUSTON	S102508533	WESTLAKE INDUSTRIES, INC.	17011 OLD BEAUMONT HIGHWAY 90		TX VCP	
HOUSTON	S102508737	AZTEC MANUFACTURING (HOUSTON)	12433 OLD BEAUMONT HIGHWAY		TX VCP	
HOUSTON	S101712388	1000FT E ON TANNER RD FROM ITS INTX WITH	1000FT E ON TANNER RD FROM ITS INTX WITH PROPOSED		SWF/LF	
HOUSTON	U001289330	QUIK SNAP	3931 E OREM	77047	UST	0059799
HOUSTON	U001293376	HANDI PLUS # 21	3655 W OREM		UST	0048874
HOUSTON	U001257669	UNKNOWN	6830 S PARK MARTIN L KIN	77033	UST	0023317
HOUSTON	S101727669		LA PORTE		TX Spills, LUST	
HOUSTON	S102508861	CITY OF HOUSTON, CITY BLOCK NO. 43	PRAIRIE, PRESTON, MILLAM, TRAVIS STREETS		TX VCP	
HOUSTON	S102508622	ALLRIGHT AUTO PARK (SEE VCP 378)	1301 PRESTON AVENUE/AMPCO SYSTEM PAR		TX VCP	
HOUSTON	U001279801	EXXON R/S # 6 - 8263	2800 REED PR1 HWY	77051	UST	0048724
HOUSTON	S102508539	TOWN AND COUNTRY SHOPPING CENTER	1000 WEST SAM HOUSTON PARKWAY		TX VCP	
HOUSTON	S101712113	ON SHERIDAN RD 2.8M E OF US 59, 13.2M FR	ON SHERIDAN RD 2.8M E OF US 59, 13.2M FROM DOWNTOW		SWF/LF	
HOUSTON	S102018738	W SIDE OF FM-521, 3-1/2MI N OF SH-6, 1-1	W SIDE OF FM-521, 3-1/2MI N OF SH-6, 1-1/2MI S HAR		SWF/LF	
HOUSTON	S101712517	SOUTH SIDE OF BELTWAY 8, 3 MI EAST OF US	SOUTH SIDE OF BELTWAY 8, 3 MI EAST OF US 59		SWF/LF	
HOUSTON	S102508541	PROVIDENCE SHOPPING CENTER	9404 SOUTH STATE HIGHWAY 6		TX VCP	
HOUSTON	S101712168	3 MI SW OF HUMBLE TX,3MI E OF US HWY 59	3 MI SW OF HUMBLE TX,3MI E OF US HWY 59 S SIDE ATA		SWF/LF	

## ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
HARRIS COUNTY	S101712529	NW CORNER OF INT OF GOODYEAR DRIVE & HWY	NW CORNER OF INT OF GOODYEAR DRIVE /		SWF/LF	
HARRIS COUNTY	S102018758	7818 EAST MT. HOUSTON RD., NEAR INT OF SH	7818 EAST MT. HOUSTON RD., NEAR INT OF		SWF/LF	
HARRIS COUNTY	S101713021	0.6 MI N OF INT OF SH288 & LOOP 610, 7303	0.6 MI N OF INT OF SH288 / LOOP 610		SWF/LF	
HOUSTON	U003104069	RACETRAC #531	HWY 249 @ BUNNY RUN		UST	0068482
HOUSTON	U001293483	HELDENFELDS CONSTRUCTION SITE	HWY 288 AT MCHARD RD		AST	
HOUSTON	S102068836		HWY 290		UST	
HOUSTON	S102508697	SOUTHEAST CORNER FM 529 AND BARKER CYPRE	FM 529 AND BARKER CYPRESS		TX VCP	
HOUSTON	U001293361	HILLCROFT TRANSIT CENTER	HWY 59 SOUTH @ BRAEWIC		UST	0048685
HOUSTON	U001293882	PIN OAK DEVELOPMENT	HWY 59 WEST 610 LOOP		UST	0057809
HOUSTON	S102069867	HILLCROFT TRANSIT CENTER	6400 HWY 59		LUST	0048685
HOUSTON	U001294304	CHEVRON FAC #201316	4981 HWY 6 AT KEI		UST	0064048
HOUSTON	U001293971	NORTHGATE NO 2 PLANT	12450 HWY 75		UST	0059120
HOUSTON	S102508557	ABLE GARAGE DOOR COMPANY	5629, 5631, AND 5707 MITCHELLDALE		TX VCP	
HOUSTON	S102508828	SOUTH HAMPTON APARTMENTS	1503 AND 1515 BISSENET		TX VCP	
HOUSTON	S102018846	APPROX 3.0 MI SE OF THE US59 & NORTH BEL	APPROX 3.0 MI SE OF THE US59 / NORTH		SWF/LF	
HOUSTON	S101712996	APPROX 300 FT SILEY RD, 0.8 MI E INTERSS I	APPROX 300 FT SILEY RD, 0.8 MI E INTERSS		SWF/LF	
HOUSTON	U001290609	J D ABRAMS, INC	LEY R @ MESA		AST	
HOUSTON	S102508727	LAKESIDE SHOPPING VILLAGE	BELTWAY 8 @ CULLEN		TX VCP	
HOUSTON	S102508717	WEST HOUSTON VETERINARY MEDICAL ASSOCIAT	10900 BLOCK OF WESTHEIMER/WILCREST		TX VCP	
HOUSTON	S102508770	ARI - BUTLER STREET FACILITY	BRIAR FOREST DRIVE/SH 6/ELDRIDGE PARKW		TX VCP	
HOUSTON	S102508669	AMERICAN RICE, INC. - BUTLER STREET FACI	3000 BUTLER ST		TX VCP	
HOUSTON	S102508690	BLOCK 71 IN DOWNTOWN HOUSTON	3000 BUTLER ST		TX VCP	
HOUSTON	S101712092	4211 CLOW RD 1.25M N OF INTX FM 1960 & S	CAROLINE/SAN JACINTO/TEXAS/CAPITOL ST/A		TX VCP	
HOUSTON	U001260857	#1223	4211 CLOW RD 1.25M N OF INTX FM 1960 /		SWF/LF	
HOUSTON	U001260570	EXXON CO. USA 64655	STUEBNER		UST	0026960
HOUSTON	U001266202	SHELL OIL CO	11100 CULLEN & HOUSTON	77047	UST	0026650
HOUSTON	U001266577	FIRE STATION #55	7303 CULLEN & HOLME	77051	UST	0033043
HOUSTON	U001291913	TRI'S MINI MART	9127 CULLEN & REED	77051	UST	0033428
HOUSTON	U001293641	WESTERN WASTE (VACANT)	11212 CULLEN	77051	UST	0062782
HOUSTON	S102508840	HOUSTON METAL PROCESSING COMPANY	7401 CULLEN & S. LOOP E	77051	UST	0054679
HOUSTON	S102508838	KAMS, INC.	5222 ELM		UST	
HOUSTON	S102508849	METRO SHARPTOWN BUS OPERATING FACILITY	5225 FIDELITY ST		TX VCP	
HOUSTON	S102508546	METRO SHARPTOWN BUS OPERATING FACILITY -	3225 NORTH FWY		TX VCP	
HOUSTON	S102508550	TRE MANAGEMENT COMPANY	6890 SOUTHWEST FWY		TX VCP	
HOUSTON	S102508823	HALIBURTON GEOPHYSICAL SERVICES FACILITY	6890 SOUTHWEST FWY		TX VCP, LUST	
HOUSTON	S102508736	ALAMO FOREST PRODUCTS	2404 SOUTHWEST FWY		TX VCP	
HOUSTON	S102508740	OXFORD APARTMENTS AND SURROUNDING PROPE	6909 SOUTHWEST FWY		TX VCP	
			4802 GULF FWY		TX VCP	
			10909 GULF FWY		TX VCP	

MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

14  
SW  
1/2-1  
Higher

QUIK SNAP GROCERY  
3931 OREM DR  
HOUSTON, TX 77000

LUST

S101111289  
N/A

LUST:

Facility ID: 0059799  
Data Entry Date: 10/07/91  
PST Coordinator: DRK  
Region: 12  
Leaking Tank #: 099999  
Responsible Party: Harris Wilbert  
RP Contact: Wilbert Harris  
5550 N Braeswood  
Houston, TX 77096

Discovery Date: 08/26/1991  
Lead Office: DISTRICT LEAD  
RPR Coordinator: RICHARD KING  
Region City ID: Houston

RP Telephone: 713/723-2295

Facility Location: E Orem

Remediation: FINAL CONCURRENCE ISSUED. CASE CLOSED

Prioritization: MINOR SOIL CONTAMINATION - DOES NOT REQUIRE A RAP

Facility Status: FINAL CONCURRENCE ISSUED. CASE CLOSED

MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

**GULF OIL CORP (Continued)**

**U001262773**

Tank ID:	3	Installation Date:	01/01/72
Tank Installer:	Not reported	Tank Tested:	Yes
Tank Emptied:	No	Status Date:	06/03/91
Capacity:	6000	Number of AST's:	0
Tank Status:	Removed from the Ground		
Tank Materials:	Steel		
Pipe Materials:	Not reported		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Not reported		
Tank Construction:	Not reported		
Other Construction:	Not reported		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Line Leak Detectors		
Pipe Release Det:	Line Leak Detectors		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	None Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Unknown/None Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	05/08/86		
Installer License Number:	Not reported		
Facility ID:	0029195	Total Tanks:	4
Tank ID:	2	Installation Date:	01/01/72
Tank Installer:	Not reported	Tank Tested:	Yes
Tank Emptied:	No	Status Date:	06/03/91
Capacity:	6000	Number of AST's:	0
Tank Status:	Removed from the Ground		
Tank Materials:	Steel		
Pipe Materials:	Not reported		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Not reported		
Tank Construction:	Not reported		
Other Construction:	Not reported		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Line Leak Detectors		
Pipe Release Det:	Line Leak Detectors		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	None Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Unknown/None Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	05/08/86		
Installer License Number:	Not reported		

MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

**GULF OIL CORP (Continued)**

**U001262773**

Facility ID:	0029195	Total Tanks:	4
Tank ID:	1	Installation Date:	01/01/56
Tank Installer:	Not reported	Tank Tested:	Yes
Tank Emptied:	No	Status Date:	06/03/91
Capacity:	550	Number of AST's:	0
Tank Status:	Removed from the Ground		
Tank Materials:	Steel		
Pipe Materials:	Not reported		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Not reported		
Tank Construction:	Not reported		
Other Construction:	Not reported		
Stored Substance:	Used Oil		
Other Substance:	Not reported		
Tank Release Det:	Line Leak Detectors		
Pipe Release Det:	Line Leak Detectors		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	None Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Unknown/None Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	05/08/86		
Installer License Number:	Not reported		

Facility ID:	0029195	Total Tanks:	4
Tank ID:	4	Installation Date:	01/01/72
Tank Installer:	Not reported	Tank Tested:	Yes
Tank Emptied:	No	Status Date:	06/03/91
Capacity:	8000	Number of AST's:	0
Tank Status:	Removed from the Ground		
Tank Materials:	Steel		
Pipe Materials:	Not reported		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Not reported		
Tank Construction:	Not reported		
Other Construction:	Not reported		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Line Leak Detectors		
Pipe Release Det:	Line Leak Detectors		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	None Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Unknown/None Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	05/08/86		
Installer License Number:	Not reported		

Facility ID:	0029195	Total Tanks:	4
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# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

## STOP-N-GO MARKETS (907) (Continued)

U001272231

Tank Registration Date: 05/08/86  
Installer License Number: Not reported

Facility ID: 0039693  
Tank ID: 2  
Tank Installer: Not reported  
Tank Emptied: No  
Capacity: 10000  
Tank Status: Removed from the Ground  
Tank Materials: Fiberglass-Reinforced Plastic (FRP)  
Pipe Materials: Fiberglass-Reinforced Plastic (FRP)  
Other Materials: Not reported  
Other Release Det: Not reported  
Pipe Construction: Not reported  
Tank Construction: Not reported  
Other Construction: Not reported  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Line Leak Detectors  
Pipe Release Det: Line Leak Detectors  
Tank Corr Prot: Noncorrodible Material (c.g. FRP)  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Unknown/None Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/08/86  
Installer License Number: Not reported

Total Tanks: 2  
Installation Date: 01/01/83  
Tank Tested: No  
Status Date: 10/22/88  
Number of AST's: 0

C12  
NNW  
1/2-1  
Higher

GULF OIL CORP. #60108020  
10315 CULLEN BLVD  
HOUSTON, TX 77047

LUST

S101106621  
N/A

### LUST:

Facility ID: 0029195  
Data Entry Date: 12/07/89  
PST Coordinator: AES/QUE/KBS/HMW  
Region: 12  
Leaking Tank #: 094059  
Responsible Party: Chevron USA Inc  
RP Contact: Graig Dodd  
PO Box 4256  
Houston, TX 77210  
RP Telephone: 713/754-3524  
Facility Location: 10315 Cullen at Airport  
Remediation: PHASE 3 IN PROGRESS  
Prioritization: GW IMPACTED, NO APPARENT THREATS OR IMPACTS TO RECEPTORS  
Facility Status: PHASE 3 IN PROGRESS

Discovery Date: 12/07/1989  
Lead Office: 1P/1  
RPR Coordinator: VYF  
Region City ID: Houston

C13  
NNW  
1/2-1  
Higher

GULF OIL CORP  
10315 CULLEN  
HOUSTON, TX 77047

UST

U001262773  
N/A

### UST:

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Databases(s)

EDR ID Number  
EPA ID Number

## NEW ERA FOOD STORES #101 (Continued)

U003103884

Capacity: 20000 Number of AST's: 0  
Tank Status: In Use  
Tank Materials: Fiberglass-Reinforced Plastic (FRP)  
Pipe Materials: Fiberglass-Reinforced Plastic (FRP)  
Other Materials: Not reported  
Other Release Det: Inventory Control  
Pipe Construction: Single Wall  
Tank Construction: Single Wall  
Other Construction: Single Wall  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Automatic In-Tank Monitoring & Inventory Control Groundwater Monitoring  
Pipe Release Det: A  
Tank Corr Prot: External Coatings - Laminate/Tape/Wrap Noncorrodible Material (c.g. FRP)  
Pipe Corr Prot: External Coatings - Laminate/Tape/Wrap Noncorrodible Material (c.g. FRP)  
Other Protection: No. Corrodible Mater  
Spill Prevention: Automatic Overfill Device - Flow Restrictor Valve Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: J & S Fuel Systems  
Contractor Registration Number: 001163  
Tank Registration Date: 06/06/96  
Installer License Number: 000110

11  
SE  
1/2-1  
Higher

STOP-N-GO MARKETS (907)  
5258 PARK VILLAGE  
HOUSTON, TX 77048

UST

U001272231  
N/A

### UST:

Facility ID: 0039693 Total Tanks: 2  
Tank ID: 1 Installation Date: 01/01/83  
Tank Installer: Not reported Tank Tested: No  
Tank Emptied: No Status Date: 10/22/88  
Capacity: 10000 Number of AST's: 0  
Tank Status: Removed from the Ground  
Tank Materials: Fiberglass-Reinforced Plastic (FRP)  
Pipe Materials: Fiberglass-Reinforced Plastic (FRP)  
Other Materials: Not reported  
Other Release Det: Not reported  
Pipe Construction: Not reported  
Tank Construction: Not reported  
Other Construction: Not reported  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Line Leak Detectors  
Pipe Release Det: Line Leak Detectors  
Tank Corr Prot: Noncorrodible Material (c.g. FRP)  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Unknown/None Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

## CIRCLE J FOOD STORE (Continued)

U002112603

Tank ID:	3	Installation Date:	01/01/85
Tank Installer:	Not reported	Tank Tested:	No
Tank Emptied:	No	Status Date:	Not reported
Capacity:	8000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		
Pipe Materials:	Fiberglass-Reinforced Plastic (FRP)		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Single Wall		
Tank Construction:	Single Wall		
Other Construction:	Single Wall		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Inventory Control Tightness Testing		
Pipe Release Det:	Tightness Testing		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	Noncorrodible Material (e.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Automatic Overfill Device - Flow Restrictor Valve Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	02/13/95		
Installer License Number:	Not reported		

B9  
NNW  
1/2-1  
Higher

## **PERFORMANCE RESTORATION** **10603 CULLEN** **HOUSTON, TX 77047**

RCRIS-SQG FINDS 1000876640  
TX0000034967

### RCRIS:

Owner: TTAROLD MALVEAUX  
(713) 734-3400

Record Date: 10/20/93

Classification: Small Quantity Generator

### BIENNIAL REPORTS:

Last Biennial Reporting Year: 1993

Waste Quantity (Lbs)

Used Oil Recyc: No

Violation Status: No violations found

B10  
NNW  
1/2-1  
Higher

## **NEW ERA FOOD STORES #101** **10600 CULLEN BLVD** **HOUSTON, TX 77047**

UST

U003103884  
N/A

### UST:

Facility ID: 0068592  
Tank ID: 696472  
Tank Installer: JOE WIGGINTON  
Tank Emptied: No

Total Tanks: 1  
Installation Date: 03/01/96  
Tank Tested: Yes  
Status Date: Not reported

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

## CIRCLE J FOOD STORE (Continued)

U002112603

Tank Installer:	Not reported	Tank Tested:	No
Tank Emptied:	No	Status Date:	Not reported
Capacity:	8000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		
Pipe Materials:	Fiberglass-Reinforced Plastic (FRP)		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Single Wall		
Tank Construction:	Single Wall		
Other Construction:	Single Wall		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Inventory Control Tightness Testing		
Pipe Release Det:	Tightness Testing		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Automatic Overfill Device - Flow Restrictor Valve Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	02/13/95		
Installer License Number:	Not reported		

Facility ID:	0066445	Total Tanks:	3
Tank ID:	2	Installation Date:	01/01/85
Tank Installer:	Not reported	Tank Tested:	No
Tank Emptied:	No	Status Date:	Not reported
Capacity:	8000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		
Pipe Materials:	Fiberglass-Reinforced Plastic (FRP)		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Single Wall		
Tank Construction:	Single Wall		
Other Construction:	Single Wall		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Inventory Control Tightness Testing		
Pipe Release Det:	Tightness Testing		
Tank Corr Prot:	Not reported		
Pipe Corr Prot:	Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Automatic Overfill Device - Flow Restrictor Valve Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	02/13/95		
Installer License Number:	Not reported		

Facility ID: 0066445

Total Tanks: 3

Map ID  
Direction  
Distance  
Elevation

MAP FINDINGS

V.H. FOOD STORE #289 (Continued)

EDR ID Number  
EPA ID Number

Database(s)

U001265478

Pipe Materials: Steel  
Other Materials: Not reported  
Other Release Det: Not reported  
Pipe Construction: Single Wall  
Tank Construction: Single Wall  
Other Construction: Single Wall  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Inventory Control Tightness Testing  
Pipe Release Det: A Tightness Testing  
Tank Corr Prot: Cathodic Protection System  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Automatic Overfill Device - Shut-Off Valve Tight-Fill Fitting

Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/08/86  
Installer License Number: Not reported

Facility ID: 0032233  
Tank ID: 2  
Tank Installer: Not reported  
Tank Emptied: No  
Capacity: 8000  
Tank Status: In Use

Total Tanks: 3  
Installation Date: 01/01/81  
Tank Tested: Yes  
Status Date: Not reported  
Number of AST's: 0

Tank Materials: Steel  
Pipe Materials: Steel  
Other Materials: Not reported  
Other Release Det: Not reported  
Pipe Construction: Single Wall  
Tank Construction: Single Wall  
Other Construction: Single Wall  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Inventory Control Tightness Testing  
Pipe Release Det: A Tightness Testing  
Tank Corr Prot: Cathodic Protection System  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Automatic Overfill Device - Shut-Off Valve Tight-Fill Fitting

Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/08/86  
Installer License Number: Not reported

8  
SSW  
1/2-1  
Higher

CIRCLE J FOOD STORE  
12310 CULLEN BLVD  
HOUSTON, TX 77047

UST

U002112603  
N/A

UST:

Facility ID: 0066445  
Tank ID: 1

Total Tanks: 3  
Installation Date: 01/01/85

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

## MANNING 66 (Continued)

S101879758

### LUST:

Facility ID:	0026960	Discovery Date:	12/21/1995
Data Entry Date:	02/07/96	Lead Office:	1P/1
PST Coordinator:	AES/RPR	RPR Coordinator:	DLB
Region:	12	Region City ID:	Houston
Leaking Tank #:	110209		
Responsible Party:	Ada Inc		
RP Contact:	Gordon Newson		
	6603 Kirbyville		
	Houston, TX 77033		
RP Telephone:	713/644-2111		
Facility Location:	11100 Cullen		
Remediation:	PHASE 2 IN PROGRESS		
Prioritization:	NO GW IMPACT, NO APPARENT THREATS OR IMPACTS TO RECEPTORS		
Facility Status:	PHASE 2 IN PROGRESS		

7  
NNW  
1/4-1/2  
Higher

V.H. FOOD STORE #289  
10818 CULLEN  
HOUSTON, TX 77047

UST

U001265478  
N/A

### UST:

Facility ID:	0032233	Total Tanks:	3
Tank ID:	1	Installation Date:	01/01/81
Tank Installer:	Not reported	Tank Tested:	Yes
Tank Emptied:	No	Status Date:	Not reported
Capacity:	8000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		
Pipe Materials:	Steel		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Single Wall		
Tank Construction:	Single Wall		
Other Construction:	Single Wall		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Inventory Control Tightness Testing		
Pipe Release Det:	A Tightness Testing		
Tank Corr Prot:	Cathodic Protection System		
Pipe Corr Prot:	None Noncorrodible Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Automatic Overfill Device - Shut-Off Valve Tight-Fill Fitting		

Vapor Recov. Equipment Status:	Not reported
Equipment Installed Date:	Not reported
Equipment Installer:	Not reported
Contractor Registration Number:	Not reported
Tank Registration Date:	05/08/86
Installer License Number:	Not reported

Facility ID:	0032233	Total Tanks:	3
Tank ID:	3	Installation Date:	01/01/81
Tank Installer:	Not reported	Tank Tested:	Yes
Tank Emptied:	No	Status Date:	Not reported
Capacity:	8000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		

MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

**PACIFIC GULF PROPERTY (Continued)**

**U001277539**

Tank Release Det: Line Leak Detectors  
Pipe Release Det: Line Leak Detectors  
Tank Corr Prot: None  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Unknown/None Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/19/88  
Installer License Number: Not reported

A4  
NW  
1/8-1/4  
Higher

PACIFIC GULF CO  
11226 CULLEN BLVD  
HOUSTON, TX 77000

LUST

S101105259  
N/A

**LUST:**

Facility ID:	0046033	Discovery Date:	06/22/1988
Data Entry Date:	07/05/88	Lead Office:	CENTRAL OFFICE LEAD
PST Coordinator:	BRY/MSP/BL	RPR Coordinator:	RAY YORK
Region:	12	Region City ID:	Houston
Leaking Tank #:	091982		
Responsible Party:	Pacific Gulf Co		
RP Contact:	Howard Terry		
	600 Jefferson #1600		
	Houston, TX 77202		
RP Telephone:	713/659-8648		
Facility Location:	11226 Cullen		
Remediation:	FINAL CONCURRENCE ISSUED, CASE CLOSED		
Prioritization:	GROUP 1 GROUNDWATER, OFF-SITE MIGRATION UNLIKELY		
Facility Status:	FINAL CONCURRENCE ISSUED, CASE CLOSED		

5  
SW  
1/8-1/4  
Higher

AT FM 518 & FELLOWS RD INTSCN, 1.4M N OF  
AT FM 518 / FELLOWS RD INTSCN, 1.4M N OF HOUSTON  
HOUSTON, TX

SWF/LF

S101712128  
N/A

**LF:**

Facility ID:	1267	Telephone:	461-8000
Pop Served:	400000	Area Served:	HOUSTON
Tons per Day:	1000	Yards per Day:	0.00
Est Cleanup Date:	19821101	Removal Status:	FILE UPDATED 9-17-93.
Engineer:	JCB	Status Date:	Not reported
Business Type:	CITY		
Organic Acres:	45.72		
Facility Status:	PROPOSED SITE		
Facility Type:	SANITARY LANDFILL, DAILY COVER REQUIRED (POPULATION EQUIVALENT SERVED EXCEEDS 5000 PEOPLE)		
Permit Status:	Application Withdrawn		

6  
NW  
1/4-1/2  
Higher

MANNING 66  
11100 CULLEN BLVD  
HOUSTON, TX

LUST

S101879758  
N/A

MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

**PACIFIC GULF PROPERTY (Continued)**

**U001277539**

Other Substance: Not reported  
 Tank Release Det: Line Leak Detectors  
 Pipe Release Det: Line Leak Detectors  
 Tank Corr Prot: None  
 Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
 Other Protection: Not reported  
 Spill Prevention: Unknown/None Tight-Fill Fitting  
 Vapor Recov. Equipment Status: Not reported  
 Equipment Installed Date: Not reported  
 Equipment Installer: Not reported  
 Contractor Registration Number: Not reported  
 Tank Registration Date: 05/19/88  
 Installer License Number: Not reported

Facility ID: 0046033  
 Tank ID: 2  
 Tank Installer: Not reported  
 Tank Emptied: No  
 Capacity: 3000  
 Tank Status: Abandoned In-place  
 Tank Materials: Steel  
 Pipe Materials: Not reported  
 Other Materials: Not reported  
 Other Release Det: Not reported  
 Pipe Construction: Not reported  
 Tank Construction: Not reported  
 Other Construction: Not reported  
 Stored Substance: Gasoline  
 Other Substance: Not reported  
 Tank Release Det: Line Leak Detectors  
 Pipe Release Det: Line Leak Detectors  
 Tank Corr Prot: None  
 Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
 Other Protection: Not reported  
 Spill Prevention: Unknown/None Tight-Fill Fitting  
 Vapor Recov. Equipment Status: Not reported  
 Equipment Installed Date: Not reported  
 Equipment Installer: Not reported  
 Contractor Registration Number: Not reported  
 Tank Registration Date: 05/19/88  
 Installer License Number: Not reported

Total Tanks: 3  
 Installation Date: 01/01/68  
 Tank Tested: No  
 Status Date: 00/00/00  
 Number of AST's: 0

Facility ID: 0046033  
 Tank ID: 1  
 Tank Installer: Not reported  
 Tank Emptied: No  
 Capacity: 4000  
 Tank Status: Removed from the Ground  
 Tank Materials: Steel  
 Pipe Materials: Not reported  
 Other Materials: Not reported  
 Other Release Det: Not reported  
 Pipe Construction: Not reported  
 Tank Construction: Not reported  
 Other Construction: Not reported  
 Stored Substance: Gasoline  
 Other Substance: Not reported

Total Tanks: 3  
 Installation Date: 01/01/68  
 Tank Tested: No  
 Status Date: 03/18/91  
 Number of AST's: 0

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Databases)

EDR ID Number  
EPA ID Number

## SAVEWAY FOOD MART (Continued)

U001289622

Tank Corr Prot: Cathodic Protection System  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Unknown/None Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/29/86  
Installer License Number: Not reported

Facility ID: 0036198

Tank ID: 3

Tank Installer: Not reported

Tank Emptied: No

Capacity: 10000

Tank Status: In Use

Tank Materials: Steel

Pipe Materials: Fiberglass-Reinforced Plastic (FRP)

Other Materials: Not reported

Other Release Det: Not reported

Pipe Construction: Not reported

Tank Construction: Not reported

Other Construction: Not reported

Stored Substance: Gasoline

Other Substance: Not reported

Tank Release Det: Line Leak Detectors

Pipe Release Det: Line Leak Detectors

Tank Corr Prot: Cathodic Protection System

Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)

Other Protection: Not reported

Spill Prevention: Unknown/None Tight-Fill Fitting

Vapor Recov. Equipment Status: Not reported

Equipment Installed Date: Not reported

Equipment Installer: Not reported

Contractor Registration Number: Not reported

Tank Registration Date: 05/30/86

Installer License Number: Not reported

Total Tanks: 3

Installation Date: 01/01/85

Tank Tested: No

Status Date: Not reported

Number of AST's: 0

A3  
NW  
1/8-1/4  
Higher

PACIFIC GULF PROPERTY  
11226 CULLEN  
HOUSTON, TX 77047

UST

U001277539  
N/A

UST:

Facility ID: 0046033

Tank ID: 3

Tank Installer: Not reported

Tank Emptied: No

Capacity: 550

Tank Status: Abandoned In-place

Tank Materials: Steel

Pipe Materials: Not reported

Other Materials: Not reported

Other Release Det: Not reported

Pipe Construction: Not reported

Tank Construction: Not reported

Other Construction: Not reported

Stored Substance: Used Oil

Total Tanks: 3

Installation Date: 01/01/68

Tank Tested: No

Status Date: 00/00/00

Number of AST's: 0

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

## CULLEN WORK CENTER (Continued)

U002263026

Spill Prevention: Spill Container/Liquid-Tight Sump Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/08/86  
Installer License Number: Not reported

2  
SW  
1/8-1/4  
Higher

SAVEWAY FOOD MART  
11555 CULLEN  
HOUSTON, TX 77047

UST

U001289622  
N/A

### UST:

Facility ID:	0036198	Total Tanks:	3
Tank ID:	1	Installation Date:	01/01/85
Tank Installer:	Not reported	Tank Tested:	No
Tank Emptied:	No	Status Date:	Not reported
Capacity:	10000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		
Pipe Materials:	Fiberglass-Reinforced Plastic (FRP)		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Not reported		
Tank Construction:	Not reported		
Other Construction:	Not reported		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Line Leak Detectors		
Pipe Release Det:	Line Leak Detectors		
Tank Corr Prot:	Cathodic Protection System		
Pipe Corr Prot:	None Noncorroable Material (c.g. FRP)		
Other Protection:	Not reported		
Spill Prevention:	Unknown/None Tight-Fill Fitting		
Vapor Recov. Equipment Status:	Not reported		
Equipment Installed Date:	Not reported		
Equipment Installer:	Not reported		
Contractor Registration Number:	Not reported		
Tank Registration Date:	05/30/86		
Installer License Number:	Not reported		

Facility ID:	0036198	Total Tanks:	3
Tank ID:	2	Installation Date:	01/01/85
Tank Installer:	Not reported	Tank Tested:	No
Tank Emptied:	No	Status Date:	Not reported
Capacity:	10000	Number of AST's:	0
Tank Status:	In Use		
Tank Materials:	Steel		
Pipe Materials:	Fiberglass-Reinforced Plastic (FRP)		
Other Materials:	Not reported		
Other Release Det:	Not reported		
Pipe Construction:	Not reported		
Tank Construction:	Not reported		
Other Construction:	Not reported		
Stored Substance:	Gasoline		
Other Substance:	Not reported		
Tank Release Det:	Line Leak Detectors		
Pipe Release Det:	Line Leak Detectors		

# MAP FINDINGS

Map ID  
Direction  
Distance  
Elevation

Site

Database(s)

EDR ID Number  
EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

1  
WSW  
1/8-1/4  
Higher

CULLEN WORK CENTER  
11510 CULLEN  
HOUSTON, TX 77047

UST

U002263026  
N/A

## UST:

Facility ID: 0019171  
Tank ID: 1  
Tank Installer: Not reported  
Tank Emptied: No  
Capacity: 10000  
Tank Status: Removed from the Ground  
Tank Materials: Steel  
Pipe Materials: Steel  
Other Materials: Not reported  
Other Release Det: Not reported  
Pipe Construction: Not reported  
Tank Construction: Not reported  
Other Construction: Not reported  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Line Leak Detectors  
Pipe Release Det: Line Leak Detectors  
Tank Corr Prot: None  
Pipe Corr Prot: None Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported  
Spill Prevention: Unknown/None Tight-Fill Fitting  
Vapor Recov. Equipment Status: Not reported  
Equipment Installed Date: Not reported  
Equipment Installer: Not reported  
Contractor Registration Number: Not reported  
Tank Registration Date: 05/08/86  
Installer License Number: Not reported

Total Tanks: 2  
Installation Date: 01/01/62  
Tank Tested: Yes  
Status Date: 07/27/89  
Number of AST's: 0

Facility ID: 0019171  
Tank ID: 2  
Tank Installer: Not reported  
Tank Emptied: No  
Capacity: 10000  
Tank Status: In Use  
Tank Materials: Composite (steel with FRP laminate)  
Pipe Materials: Fiberglass-Reinforced Plastic (FRP)  
Other Materials: Not reported  
Other Release Det: Automatic Mon.  
Pipe Construction: Single Wall  
Tank Construction: Single Wall  
Other Construction: Single Wall  
Stored Substance: Gasoline  
Other Substance: Not reported  
Tank Release Det: Not reported  
Pipe Release Det: A Tightness Testing  
Tank Corr Prot: Composite Tank (steel w/FRP laminate)  
Pipe Corr Prot: Noncorrodible Material (c.g. FRP) Noncorrodible Material (c.g. FRP)  
Other Protection: Not reported

Total Tanks: 2  
Installation Date: 01/01/89  
Tank Tested: Yes  
Status Date: Not reported  
Number of AST's: 0

<p align="center"><b>MAP FINDINGS SUMMARY SHOWING ONLY SITES HIGHER THAN OR THE SAME ELEVATION AS TP</b></p>
--

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
NPL		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
RCRIS-TSD		1.000	0	0	0	0	NR	0
State Haz. Waste		1.000	0	0	0	0	NR	0
CERCLIS		1.000	0	0	0	0	NR	0
CERC-NFRAP		1.000	0	0	0	0	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
State Landfill		1.000	0	1	0	0	NR	1
LUST		1.000	0	1	1	2	NR	4
UST		1.000	0	3	1	4	NR	8
AST		1.000	0	0	0	0	NR	0
RAATS		1.000	0	0	0	0	NR	0
RCRIS Sm. Quan. Gen.		1.000	0	0	0	1	NR	1
RCRIS Lg. Quan. Gen.		1.000	0	0	0	0	NR	0
HMIRS		1.000	0	0	0	0	NR	0
PADS		1.000	0	0	0	0	NR	0
ERNS		1.000	0	0	0	0	NR	0
FINDS		1.000	0	0	0	1	NR	1
TRIS		1.000	0	0	0	0	NR	0
NPL Liens		1.000	0	0	0	0	NR	0
TSCA		1.000	0	0	0	0	NR	0
MLTS		1.000	0	0	0	0	NR	0
TX Spills		1.000	0	0	0	0	NR	0
WasteMgt		1.000	0	0	0	0	NR	0
TX VCP		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
CONSENT		1.000	0	0	0	0	NR	0
Coal Gas		1.000	0	0	0	0	NR	0

TP = Target Property

NR = Not Requested at this Search Distance

\* Sites may be listed in more than one database

# MAP FINDINGS SUMMARY SHOWING ALL SITES

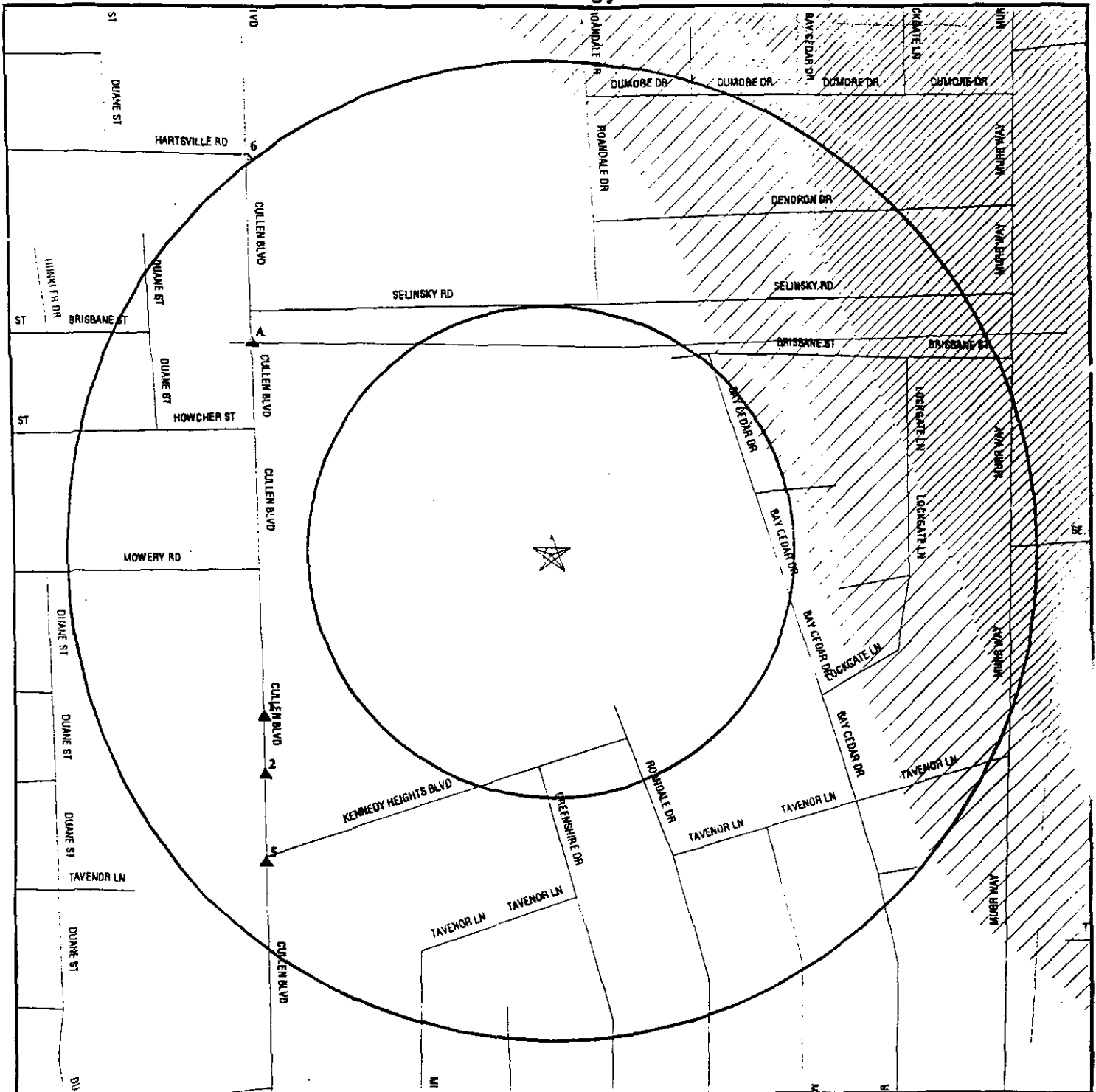
Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
NPL		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
RCRIS-TSD		1.000	0	0	0	0	NR	0
State Haz. Waste		1.000	0	0	0	0	NR	0
CERCLIS		1.000	0	0	0	0	NR	0
CERC-NFRAP		1.000	0	0	0	0	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
State Landfill		1.000	0	1	0	0	NR	1
LUST		1.000	0	1	1	2	NR	4
UST		1.000	0	3	1	4	NR	8
AST		1.000	0	0	0	0	NR	0
RAATS		1.000	0	0	0	0	NR	0
RCRIS Sm. Quan. Gen.		1.000	0	0	0	1	NR	1
RCRIS Lg. Quan. Gen.		1.000	0	0	0	0	NR	0
HMIRS		1.000	0	0	0	0	NR	0
PADS		1.000	0	0	0	0	NR	0
ERNS		1.000	0	0	0	0	NR	0
FINDS		1.000	0	0	0	1	NR	1
TRIS		1.000	0	0	0	0	NR	0
NPL Liens		1.000	0	0	0	0	NR	0
TSCA		1.000	0	0	0	0	NR	0
MLTS		1.000	0	0	0	0	NR	0
TX Spills		1.000	0	0	0	0	NR	0
WasteMgt		1.000	0	0	0	0	NR	0
TX VCP		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
CONSENT		1.000	0	0	0	0	NR	0
Coal Gas		1.000	0	0	0	0	NR	0

TP = Target Property

NR = Not Requested at this Search Distance

\* Sites may be listed in more than one database

# DETAIL MAP - 0193788.1r - Ecology and Environment, Inc.



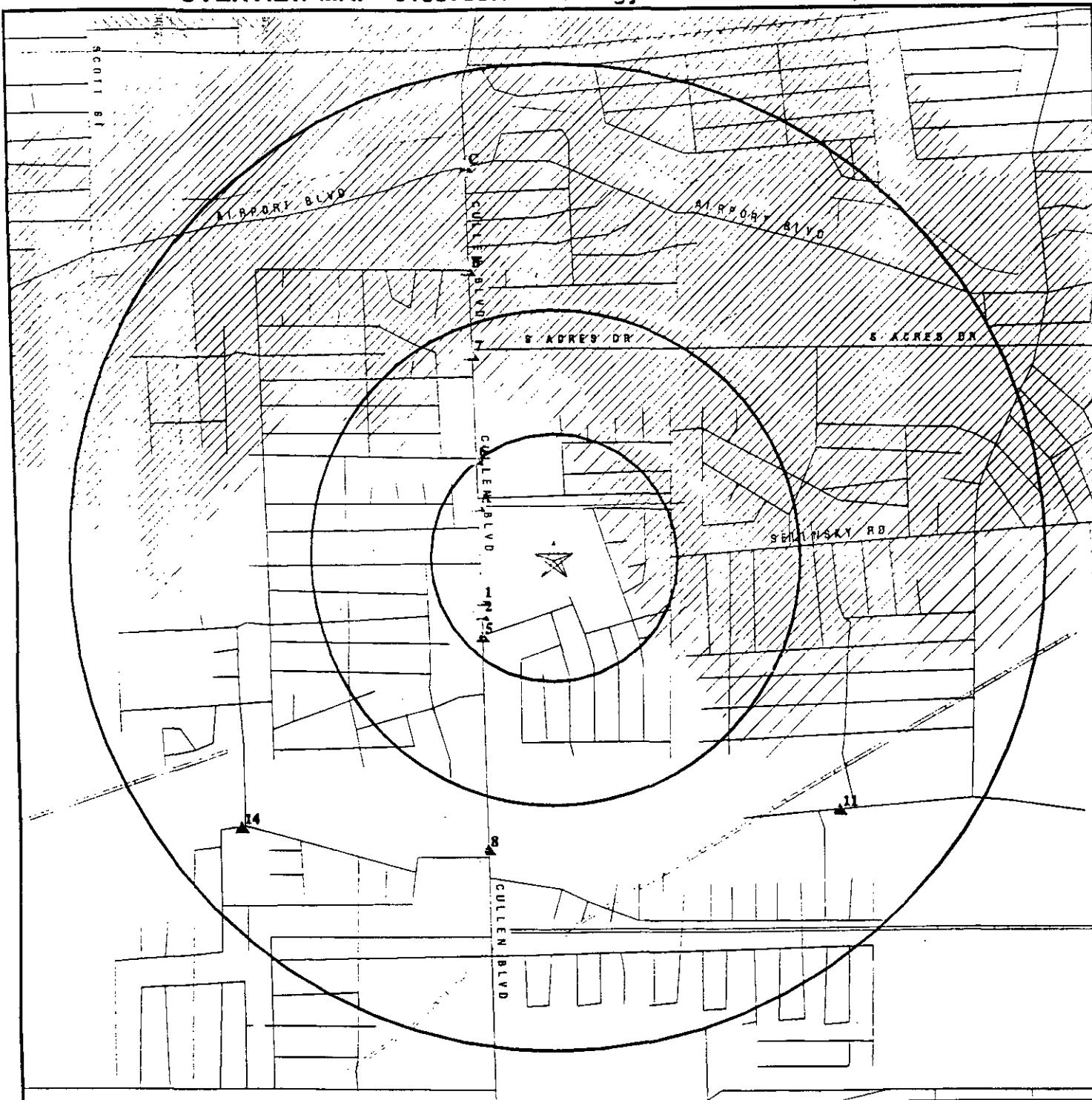
- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites (if requested)
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites

- Power transmission lines
- Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone

TARGET PROPERTY: Kennedy Heights Subdivision  
 ADDRESS: Selinsky Rd/Murr Wy/Schnur Pk  
 CITY/STATE/ZIP: Houston TX 77048  
 LAT/LONG: 29.6361 / 95.3532

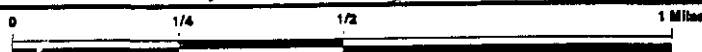
CUSTOMER: Ecology and Environment, Inc.  
 CONTACT: Ms. Kris Lloyd  
 INQUIRY #: 0193788.1r  
 DATE: August 25, 1997 9:46 am

# OVERVIEW MAP - 0193788.1r - Ecology and Environment, Inc.



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites (if requested)
- National Priority List Sites
- Landfill Sites

- Power transmission lines
- Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone



TARGET PROPERTY: Kenneady Heights Subdivision  
 ADDRESS: Selinsky Rd/Murr Wy/Schnur Pk  
 CITY/STATE/ZIP: Houston TX 77048  
 LAT/LONG: 29.6361 / 95.3532

CUSTOMER: Ecology and Environment, Inc.  
 CONTACT: Ms. Kris Lloyd  
 INQUIRY #: 0193788.1r  
 DATE: August 25, 1997 9:43 am

## GEOCHECK VERSION 2.1 SUMMARY

### PUBLIC WATER SUPPLY SYSTEM INFORMATION (EPA-FRDS)

Searched by Facility City.

For detailed information on the Public Water Supply Systems in the TP area refer to the GeoCheck Addendum.

### AREA RADON INFORMATION

HARRIS COUNTY, TX

Number of sites tested: 115

<u>Area</u>	<u>Average Activity</u>	<u>% &lt;4 pCi/L</u>	<u>% 4-20 pCi/L</u>	<u>% &gt;20 pCi/L</u>
Living Area - 1st Floor	0.425 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

# GEOCHECK VERSION 2.1 SUMMARY

## GEOLOGIC AGE IDENTIFICATION†

Geologic Code: Qp  
Era: Cenozoic  
System: Quaternary  
Series: Pleistocene

## ROCK STRATIGRAPHIC UNIT†

Category: Stratified Sequence

## GROUNDWATER FLOW INFORMATION

*Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, including well data collected on nearby properties, regional groundwater flow information (from deep aquifers), or surface topography.‡*

General Topographic Gradient: General NE  
General Hydrogeologic Gradient: No hydrogeologic data available.

## USGS TOPOGRAPHIC MAP ASSOCIATED WITH THIS SITE

Target Property: 2429095-F3 PARK PLACE, TX

## SEARCH DISTANCE RADIUS INFORMATION

<u>DATABASE</u>	<u>SEARCH DISTANCE (miles)</u>
Federal Database	1.000
State Database	1.000
PWS Database	1.000

## FEDERAL DATABASE WELL INFORMATION

<u>WELL DIRECTION</u>	<u>DISTANCE FROM TP</u>	<u>LITHOLOGY</u>	<u>DEPTH TO WATER TABLE</u>
NO WELLS FOUND			

## STATE DATABASE WELL INFORMATION

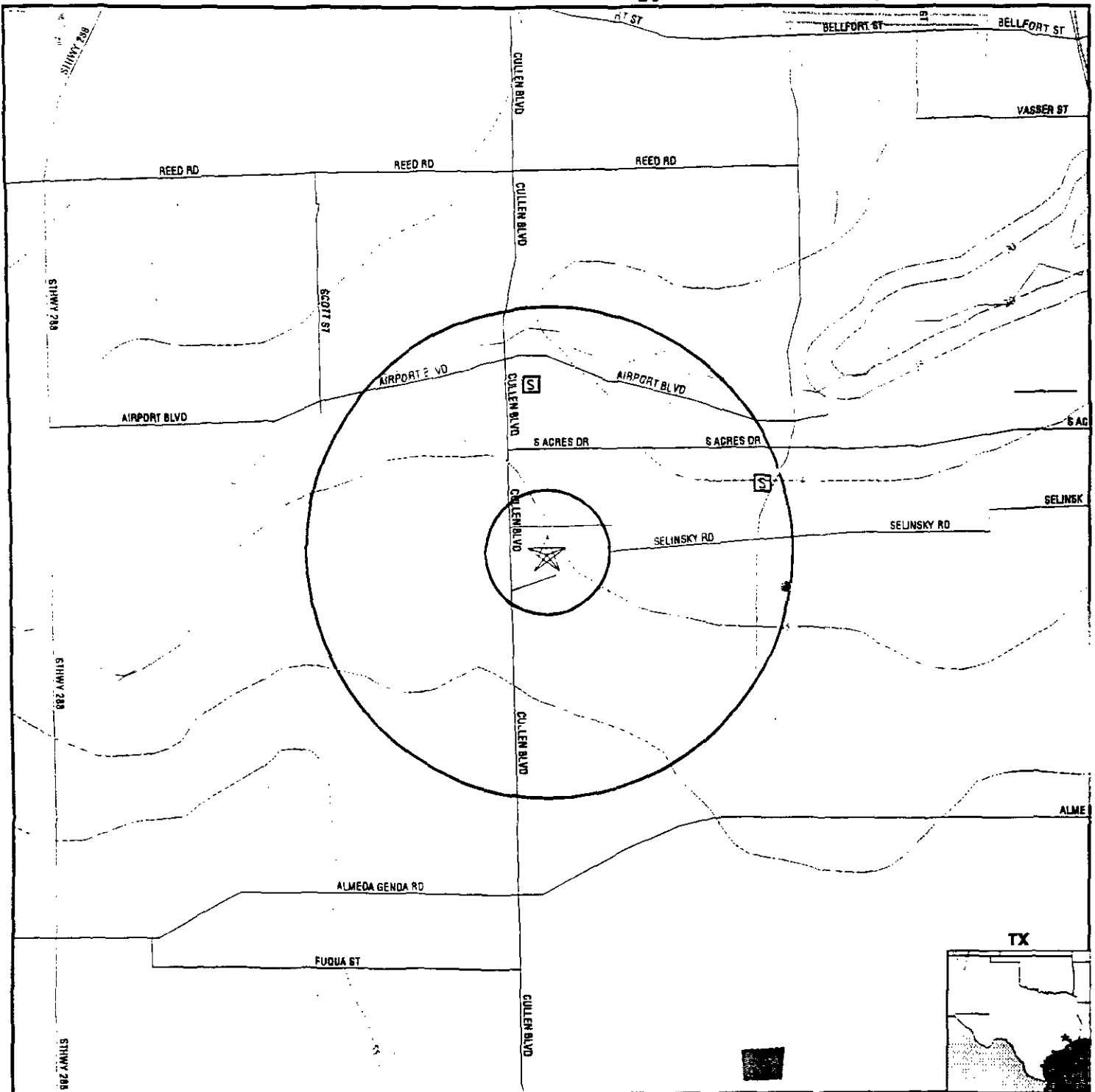
<u>WELL DIRECTION</u>	<u>DISTANCE FROM TP</u>
North	1/2 - 1 Mile
North	1/2 - 1 Mile
North	1/2 - 1 Mile
North	1/2 - 1 Mile
North	1/2 - 1 Mile
North	1/2 - 1 Mile
ENE	1/2 - 1 Mile

## STATE OIL/GAS WELL INFORMATION

<u>WELL DIRECTION</u>	<u>DISTANCE FROM TP</u>
East	1/2 - 1 Mile

† Source: F. J. Schruben, R. E. Arndt and W. J. Baer, Jr., Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS-11 (1994)  
‡ U.S. EPA Ground Water Handbook, Vol. 1 Ground Water and Contamination, Office of Research and Development, EPA/625/5-90/015a Chapter 4, page 7B, September 1990

# TOPOGRAPHIC MAP - 0193788.1r - Ecology and Environment, Inc.



- Major Roads
- Contour Lines
- Waterways
- Earthquake epicenter, Richter 5 or greater
- Federal Wells
- State Wells
- Public Water Supply Wells
- Oil or gas wells (in certain Texas counties)

**TARGET PROPERTY:** Kennedy Heights Subdivision  
**ADDRESS:** Selinsky Rd/Murr Wy/Schnur Pk  
**CITY/STATE/ZIP:** Houston TX 77048  
**LAT/LONG:** 29.6361 / 95.3532

**CUSTOMER:** Ecology and Environment, Inc.  
**CONTACT:** Ms. Kris Lloyd  
**INQUIRY #:** 0193788.1r  
**DATE:** August 25, 1997 9:48 am

# GEOCHECK VERSION 2.1

## PUBLIC WATER SUPPLY SYSTEM INFORMATION

Searched by Facility City.

### PWS SUMMARY:

PWS ID:	LA2117154	PWS Status:	Active	Distance from TP:	Not Reported
Date Initiated:	Not Reported	Date Deactivated:	Not Reported		
PWS Name:	UNITED GAS UNITED GAS PIPELINE P.O. BOX 1478 HOUSTON, TX 77251				

Addressee / Facility: System Owner/Responsible Party  
UNITED GAS PIPELINE

Addressee / Facility: Operator  
JIMMY STAFFORD

Facility Latitude:	Not Reported	Facility Longitude:	Not Reported
City Served:	Not Reported		
Treatment Class:	Untreated	Population Served:	Under 101 Persons

Well currently has or has had major violation(s): No

PWS ID:	NJ1P05327	PWS Status:	Active	Distance from TP:	Not Reported
Date Initiated:	January / 1994	Date Deactivated:	Not Reported		
PWS Name:	TRANSCONTINENTAL GAS PIPELINE TRANSCONTINENTAL GAS PIPE CORP P.O. BOX 1396 HOUSTON, TX 772511396				

Addressee / Facility: System Owner/Responsible Party  
TRANSCONTINENTAL GAS PIPELINE  
WILLIAM R. LANDERLYN  
623 CASE ROAD  
NESHANIC STATION, NJ 08853

Facility Latitude:	Not Reported	Facility Longitude:	Not Reported
City Served:	BRANCHBURG TWP		
Treatment Class:	Untreated	Population Served:	Under 101 Persons

Well currently has or has had major violation(s): Yes

### VIOLATIONS INFORMATION:

Violation ID:	9449577	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	04/01/94	Vio. end Date:	06/30/94	Vio. Period:	3 Months
Num of required Samples:	Not Reported	Number of Samples Taken:	Not Reported		
Analysis Result:	Not Reported	Maximum Contaminant Level:	Not Reported		
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Routine Major (TCR)				
Contaminant:	COLIFORM (TCR)				
Vio. Awareness Date:	081194				

Violation ID:	9337386	Source ID:	Not Reported	PWS Phone:	Not Reported
Vio. beginning Date:	01/01/93	Vio. end Date:	12/31/93	Vio. Period:	12 Month
Num of required Samples:	Not Reported	Number of Samples Taken:	0		
Analysis Result:	Not Reported	Maximum Contaminant Level:	Not Reported		
Analysis Method:	Not Reported				
Violation Type:	Monitoring, Regular				
Contaminant:	NITRATE				
Vio. Awareness Date:	Not Reported				

## EXECUTIVE SUMMARY

HALIBURTON GEOPHYSICAL SERVICES FACILITY	TX VCP
ALAMO FOREST PRODUCTS	TX VCP
OXFORD APARTMENTS AND SURROUNDING PROPER	TX VCP
NORTHWAY PARK II	TX VCP
KIRKWOOD COUNTRY (CHESSINGTON)	TX VCP
NILS SEFELDT VOLVO DEALERSHIP	TX VCP
WEST JUNCTION SHOPPING CENTER	TX VCP
WESTLAKE INDUSTRIES, INC.	TX VCP
AZTEC MANUFACTURING (HOUSTON)	TX VCP
CITY OF HOUSTON, CITY BLOCK NO. 43	TX VCP
ALLRIGHT AUTO PARK (SEE VCP 378)	TX VCP
TOWN AND COUNTRY SHOPPING CENTER	TX VCP
PROVIDENCE SHOPPING CENTER	TX VCP
WESLAYAN PLAZA WEST SHOPPING CENTER	TX VCP

## EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
NW CORNER OF INT OF GOODYEAR DRIVE & HWY 7818 EAST MT. HOUSTON RD., NEARINT OF SH 0.6MI N OF INT OF SH288 & LOOP 610 .7303	SWF/LF
APPROX 3.0 MI SE OF THE US59 & NORTH BEL	SWF/LF
APPROX 300FT SE LEY RD.0.8MI E INTRSS LE	SWF/LF
4211 CLOW RD 1.25M N OF INTX FM 1960 & S	SWF/LF
0.5 MILES N OF THE INTERCHANGE OF LOOP 6	SWF/LF
2 MILES SOUTH SOUTHWEST OF THE LOOP 610	SWF/LF
N OF WESTPARK DR. S OF US 59. .4M W OF C	SWF/LF
N OF US 90.S OF LEY RD..9M E FM 527 IN H	SWF/LF
S OF BOUDREAUX RD.. 2500'SW OF FM 2920,	SWF/LF
E OF ANAGNOST RD	SWF/LF
NORTH OF TANNER ROAD. BETWEEN CRAWFORD S	SWF/LF
E OF S EXIT PETRO LA S HOLMES RD .4M N	SWF/LF
1000FT E ON TANNER RD FROM ITS INTX WITH	SWF/LF
ON SHERIDAN RD 2.8M E OF US 59, 13.2M FR	SWF/LF
W SIDE OF FM-521. 3-1/2MI N OF SH-6. 1-1	SWF/LF
SOUTH SIDE OF BELTWAY 8. 3 MI EAST OF US	SWF/LF
3 MI SW OF HUMBLE TX.3MI E OF US HWY 59	SWF/LF
ON US290.4.8M NW HOUSTON CTY LMTS.7.5M S	SWF/LF
HWY 290	LUST
HILLCROFT TRANSIT CENTER	LUST
TRE MANAGEMENT COMPANY	TX VCP,LUST
FAST SEVEN FOOD STORE	LUST
LA PORTE	TX Spills,LUST
RACETRAC #531	UST
HILLCROFT TRANSIT CENTER	UST
PIN OAK DEVELOPMENT	UST
CHEVRON FAC #201316	UST
NORTHGATE NO 2 PLANT	UST
#1223	UST
EXXON CO. USA 64655	UST
SHELL OIL CO	UST
FIRE STATION #55	UST
TRI'S MINI MART	UST
WESTERN WASTE (VACANT)	UST
TEXAS OXYGEN	UST
REX AUTO REPAIR	UST
COASTAL HOBBY REFUELER	UST
9206 MARTIN LUTHER KING	UST
STOP N GO #2586	UST
QUIK SNAP	UST
HANDI PLUS # 21	UST
UNKNOWN	UST
EXXON R/S # 6 - 8263	UST
HELDENFELDS CONSTRUCTION SITE	AST
J D ABRAMS, INC	AST
SOUTHEAST CORNER FM 529 AND BARKER CYPRE	TX VCP
ABLE GARAGE DOOR COMPANY	TX VCP
SOUTHAMPTON APARTMENTS	TX VCP
LAKESIDE SHOPPING VILLAGE	TX VCP
WEST HOUSTON VETERINARY MEDICAL ASSOCIAT	TX VCP
ARI - BUTLER STREET FACILITY	TX VCP
AMERICAN RICE, INC. - BUTLER STREET FACI	TX VCP
BLOCK 71 IN DOWNTOWN HOUSTON	TX VCP
HOUSTON METAL PROCESSING COMPANY	TX VCP
KAMS, INC.	TX VCP
METRO SHARPSTOWN BUS OPERATING FACILITY	TX VCP
METRO SHARPTOWN BUS OPERATING FACILITY -	TX VCP

## EXECUTIVE SUMMARY

**RCRIS:** The Resource Conservation and Recovery Act database includes selected information on sites that generate, store, treat, or dispose of hazardous waste as defined by the Act. The source of this database is the U.S. EPA.

A review of the RCRIS-SQG list, as provided by EDR, and dated 04/01/1997 has revealed that there is 1 RCRIS-SQG site within approximately 1 Mile of the subject property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
<b>PERFORMANCE RESTORATION</b>	<b>10603 CULLEN</b>	<b>1/2 - 1 NNW B9</b>		<b>17</b>

**FINDS:** The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FUIRS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 09/30/1995 has revealed that there is 1 FINDS site within approximately 1 Mile of the subject property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
<b>PERFORMANCE RESTORATION</b>	<b>10603 CULLEN</b>	<b>1/2 - 1 NNW B9</b>		<b>17</b>

## EXECUTIVE SUMMARY

### Surrounding Properties:

Elevations have been determined from the USGS 1 degree Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. EDR's definition of a site with an elevation equal to the subject property includes a tolerance of -10 feet. Sites with an elevation equal to or higher than the subject property have been differentiated below from sites with an elevation lower than the subject property (by more than 10 feet). Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

**SWF/LF:** The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data comes from the Texas Natural Resource Conservation Commission's permitted Solid Waste Facilities list.

A review of the SWF/LF list, as provided by EDR, and dated 05/15/1997 has revealed that there is 1 SWF/LF site within approximately 1 Mile of the subject property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
AT FM 518 & FELLOWS RD INTSCN.	AT FM 518 / FELLOWS R	1/8 - 1/4 SW	5	13

**LUST:** The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data comes from the Texas Natural Resource Conservation Commission's Leaking Petroleum Storage Tank Database.

A review of the LUST list, as provided by EDR, and dated 04/07/1997 has revealed that there are 4 LUST sites within approximately 1 Mile of the subject property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
PACIFIC GULF CO	11226 CULLEN BLVD	1/8 - 1/4 NW	A4	13
MANNING 66	11100 CULLEN BLVD	1/4 - 1/2 NW	6	13
GULF OIL CORP. #60108020	10315 CULLEN BLVD	1/2 - 1 NNW	C12	19
QUIK SNAP GROCERY	3931 OREM DR	1/2 - 1 SW	14	22

**UST:** The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data comes from the Texas Natural Resource Conservation Commission's Petroleum Storage Tank Database.

A review of the UST list, as provided by EDR, and dated 04/01/1997 has revealed that there are 8 UST sites within approximately 1 Mile of the subject property.

<u>Equal/Higher Elevation</u>	<u>Address</u>	<u>Dist / Dir</u>	<u>Map ID</u>	<u>Page</u>
CULLEN WORK CENTER	11510 CULLEN	1/8 - 1/4 WSW	1	9
SAVEWAY FOOD MART	11555 CULLEN	1/8 - 1/4 SW	2	10
PACIFIC GULF PROPERTY	11226 CULLEN	1/8 - 1/4 NW	A3	11
V.H. FOOD STORE #289	10818 CULLEN	1/4 - 1/2 NNW	7	14
CIRCLE J FOOD STORE	12310 CULLEN BLVD	1/2 - 1 SSW	8	15
NEW ERA FOOD STORES #101	10600 CULLEN BLVD	1/2 - 1 NNW	B10	17
STOP-N-GO MARKETS (907)	5258 PARK VILLAGE	1/2 - 1 SE	11	18
GULF OIL CORP	10315 CULLEN	1/2 - 1 NNW	C13	19

## EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-97. Search distances are per ASTM standard or custom distances requested by the user.

The address of the subject property for which the search was intended is:

SELINSKY RD/MURR WY/SCHNUR PK  
HOUSTON, TX 77048

No mapped sites were found in EDR's search of available ( "reasonably ascertainable ") government records either on the subject property or within the ASTM E 1527-97 search radius around the subject property for the following Databases:

NPL:	National Priority List
Delisted NPL:	NPL Deletions
RCRIS-TSD:	Resource Conservation and Recovery Information System
SHWS:	State Superfund Registry
CERCLIS:	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP:	Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS:	Corrective Action Report
AST:	Petroleum Storage Tank Database
RAATS:	RCRA Administrative Action Tracking System
RCRIS-LQG:	Resource Conservation and Recovery Information System
HMIRS:	Hazardous Materials Information Reporting System
PADS:	PCB Activity Database System
ERNS:	Emergency Response Notification System
TRIS:	Toxic Chemical Release Inventory System
NPL Lien:	Federal Superfund Liens
TSCA:	Toxic Substances Control Act
MLTS:	Material Licensing Tracking System
TX Spills:	Spills Database
WasteMgt:	Commercial Hazardous & Solid Waste Management Facilities
TX VCP:	Texas Natural Resource Conservation Commission
ROD:	Records Of Decision
CONSENT:	Superfund (CERCLA) Consent Decrees
Coal Gas:	Former Manufactured gas (Coal Gas) Sites.

Unmapped (orphan) sites are not considered in the foregoing analysis.

### Search Results:

Search results for the subject property and the search radius, are listed below:

### Subject Property:

The subject property was not listed in any of the databases searched by EDR.

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***Thank you for your business.***  
Please contact EDR at 1-800-352-0050  
with any questions or comments.

### Disclaimer

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**Inquiry Number: 0193788.1r**

**August 25, 1997**

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## **REFERENCE 6**

### Evangeline Aquifer

The Evangeline aquifer, composed of the Goliad Sand and the upper part of the Fleming Formation, is similar in lithology to the Chicot aquifer. One difference between the two aquifers is that the Evangeline aquifer generally has a smaller hydraulic conductivity than does the Chicot aquifer. The contrast in hydraulic conductivity and a difference in water levels are the bases for separating the Evangeline aquifer from the Chicot aquifer. The altitude of the base of the Evangeline aquifer is shown in figure 4. The Evangeline aquifer is the major source of ground water in the Houston district. In Galveston and southern Harris Counties, water in the Evangeline aquifer is saline and is not used.

### Jasper Aquifer

The Jasper aquifer is composed of interbedded sand and clay layers consisting almost entirely of terrigenous clastic sediments. The approximate altitude of the top of the Jasper aquifer is shown in figure 5. Because the Jasper aquifer underlies shallower aquifers, withdrawals from the Jasper aquifer in terms of total withdrawals in Harris County are not significant. However, hydraulically it is capable of yields of as much as 3,000 gal/min to wells in adjacent Montgomery County (Baker, 1983). Only the upper part of the Jasper aquifer is utilized in Harris County.

## DEVELOPMENT OF GROUND WATER

Several publications document the historical development of ground-water withdrawals in the Houston district (Wood and Gabrysch, 1965; Gabrysch, 1972, 1980, 1982; Jorgensen, 1975; Carr and others, 1985). The areas discussed in this report are Houston, Katy, Pasadena, Baytown-LaPorte, Johnson Space Center, Texas City, and Alta Loma (fig. 6).

Prior to 1977, ground water was the major source of freshwater available in the Houston district. Small quantities of surface water obtained from Lake Houston on the San Jacinto River had been available in parts of the Houston district since 1954. The city of Galveston began using surface water from Lake Houston in 1973. In late 1976, surface water from Lake Livingston on the Trinity River became available. The availability of the increased surface water caused ground-water production to decrease substantially in all areas of the Houston district except the Katy area.

In areas to the north, west, and southwest of the Houston area (fig. 6), ground-water withdrawals for public supply have steadily increased due to urban expansion and the lack of surface water. The average daily ground-water withdrawals for public supply, industrial use, and irrigation in the Houston district during 1975-84 are listed in tables 2-4.

In general, until 1977, water levels in wells in the Houston district were declining. However, during the last several years, Houston and several adjacent areas have been converting from ground water to surface water as the main water supply. With the increasing conversion from ground-water use to surface-water use, water levels in wells in the Chicot and Evangeline aquifers began to rise

## INTRODUCTION

The purpose of this report is to provide information about ground-water withdrawals, changes in ground-water levels, ground-water quality, and trends in land-surface subsidence in the Houston district during 1980-84. Some data collected prior to 1980 and during the early spring of 1985 are presented to establish long-term trends and relations.

The Houston district, as described in this report, includes all of Galveston County and parts of Brazoria, Chambers, Fort Bend, Harris, Liberty, and Waller Counties (fig. 1). Many homeowners, well drillers, industrial-plant managers, and State and municipal officials provided information for this report. Financial support was provided by the city of Houston and the Harris-Galveston Coastal Subsidence District in a cooperative agreement with the U.S. Geological Survey.

## GEOHYDROLOGY OF THE STUDY AREA

The geohydrologic units discussed in this report primarily are the Chicot and Evangeline aquifers. The Jasper aquifer also underlies the Houston district, but contains water of poor quality except in the northern part of the district. Only two wells presently are known to yield water from the Jasper aquifer in Harris County. These aquifers are composed of sedimentary deposits in the Coastal Plain physiographic province. The province is a broad plain underlain by a southeasterly thickening wedge of layered beds of clay, silt, sand, and gravel. The geologic formations in the study area are, from oldest to youngest: The Oakville Sandstone and Fleming Formation of Miocene age; the Goliad Sand of Pliocene age; the Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Formation of Pleistocene age; and alluvium of Quaternary age. The relation among the geohydrologic units and the geologic formations is given in table 1. A generalized geohydrologic section of the Chicot, Evangeline, and Jasper aquifers through Montgomery, Harris, Brazoria, and Galveston Counties is shown in figure 2.

### Chicot Aquifer

The Chicot aquifer includes all deposits from the land surface to the top of the Evangeline aquifer. The Chicot aquifer is composed of the Willis Sand, Bentley Formation, Montgomery Formation, Beaumont Formation, and Quaternary alluvium. The altitude of the base of the Chicot aquifer is shown in figure 3. The discontinuous sand and clay layers of the Chicot aquifer in some parts of the study area are separated into an upper and lower unit (Jorgensen, 1975, p. 10). When the upper unit of the Chicot aquifer cannot be defined, the aquifer is undifferentiated. The Chicot aquifer is under confined conditions except in the northern part of the district. Generally, in southeastern Harris County and most of Galveston County, the Chicot aquifer contains a thick sand section that has a relatively large (as much as 75 ft/d) hydraulic conductivity (Jorgensen, 1975, p. 15). This sand unit has been intensely pumped and is known locally as the Alta Loma Sand (Alta Loma Sand of Rose, 1943). In this area, there also is another sand unit within the Chicot aquifer referred to as the middle Chicot aquifer. The Chicot aquifer is the main source of ground water in Galveston and southern Harris Counties.

**GROUND-WATER WITHDRAWALS AND CHANGES IN  
GROUND-WATER LEVELS, GROUND-WATER QUALITY, AND  
LAND-SURFACE SUBSIDENCE IN THE HOUSTON DISTRICT,  
TEXAS, 1980-84**

**By James F. Williams III and C.E. Ranzau, Jr.**

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**U.S. GEOLOGICAL SURVEY**

**Water-Resources Investigations Report 87-4153**



**Prepared in cooperation with the  
CITY OF HOUSTON and the  
HARRIS-GALVESTON COASTAL SUBSIDENCE DISTRICT**

**Austin, Texas  
1987**

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## **REFERENCE 5**

#### **4.5 Investigation of Methane in Former Southeast Tank**

In March 1997, Chevron performed a soil gas survey in the former Southeast Tank at the two ETI locations with the highest reported methane values (Table 4-1). Despite the residents' objections, Chevron was able to obtain access to these two locations because they were in the city right-of-way (Plate 3).

#### **4.6 Carbon Dating of Vapor and Soil Samples**

Three vapor samples and two soil samples were collected for radiocarbon dating. The vapor samples were collected in Tedlar bags at the following soil gas survey points: SG-NE18F, SG-NE19A, and SG-SE1C. Soil samples were collected from soil boring SB-SE6 3.9-4.9' and SB-4(6-8'). The samples were submitted to Geochron Laboratories in Cambridge, Massachusetts.

#### **4.7 Methane Sampling Results**

The analytical results for methane soil background samples are summarized in Table 4-2. Results of the Phase 1 and Phase 3 investigations of ETI's 'red zone' contour maps are presented in Table 4-3. The results of the closely spaced methane sampling around ETI's reported high methane concentrations are found in Table 4-4. TEG's report for the Phase 3 work is provided in Appendix K. The results of the radiocarbon dating are summarized in Table 4-5. Geochron's laboratory reports are provided in Appendix L. The Guelph permeameter tests are summarized in Table 4-6. Each test indicates that the unsaturated soils have a saturated field hydraulic conductivity less than the instrument's measurement capacity ( $1 \times 10^{-6}$  cm/sec). Additional discussion and interpretation of the soil gas methane data is presented in Exhibit A.

#### 4.3.4 Ambient Air Sampling

Chevron proposed in the CWP to conduct an air sampling survey at 31 lots that are wholly or partially within the bermed area of the former Northeast Tank. The survey was proposed for the interior and exterior of the homes. Chevron was denied access by the residents to do this work.

#### 4.3.5 Evaluation of Methane Accumulation in Utility Line Backfill

On March 5, 1997, the potential for methane accumulation or migration in sewer line backfill was assessed. This was done by sampling the backfill material surrounding the sewer lines, to see if the utility lines were surrounded by permeable sand bedding that could serve as a migratory pathway or 'trap' for vapors. Sewer line backfill samples were collected at (b) (6). These locations were selected after reviewing utility maps to determine which sewer lines were upslope from the former Northeast Tank. The depth to the top of the sewerline was estimated by measuring the top of the sewerline in the manhole adjacent to the above addresses. Sample collection points were located within 10 feet and downslope of sewerline manholes. The top of the sewer lines are about 48 and 70 inches below grade at the (b) (6) manholes, respectively. Direct push technology was used to advance a probe and a split spoon sampler was used to collect samples. Based on field observations, the backfill material immediately above both sewerlines is a dark brown and gray, highly plastic clay. Sand bedding material was not observed in the soil samples.

#### 4.3.6 Field Permeability Tests

On January 2 and 3, 1997, the saturated hydraulic conductivity of soils next to monitor wells MW-NE1, MW-NE2, MW-NE3, MW-NE4, and MW-NE5 was measured with a guelph permeameter (Plate 1). One measurement was performed within ten feet of each well. The total depth of the test boreholes used to measure the field saturated hydraulic conductivity ranged from 1.0 to 1.5 feet. With the exception of MW-NE3, water levels in the monitor wells were determined to be below the total depth of the test boreholes. Field records are provided in Appendix H.

#### 4.4 Investigation of Methane in Former Northwest Tank

Chevron proposed in the CWP to conduct a soil gas survey in the former Northwest Tank at the two ETI locations with the highest reported methane values. The residents denied Chevron access to complete this work.

Multiple probe points were taken at each location to identify the spatial and vertical distribution of methane. Investigation results have been previously submitted to the RRC (SASI, 1996).

#### **4.2 Background Methane Sampling**

During the Phase 3 investigation, the residents did not allow Chevron access to the background locations proposed in the CWP. Consequently, Chevron obtained approval from the City of Houston to sample for methane in Schnur Park, which is located south of the former Southeast Tank (Figure 4-1). Methane was sampled at 24 locations in the park (SGBG-1 through SGBG-24). After further discussions with the City, Chevron received access to the city right-of-ways adjacent to where the original background samples were proposed. These background samples were collected during February 1997.

Background samples were collected from the neighborhood at the locations shown on Figure 4-1. Sample names and addresses are listed in Table 4-1. The background samples were collected to establish naturally occurring background ranges for methane gas within the top seven feet of soil.

#### **4.3 Investigation of Methane in Former Northeast Tank**

##### **4.3.1 Methane Testing Beneath Residential Foundations**

For the Phase 3 investigation, Chevron proposed to conduct methane investigations below residential foundations at houses overlying the former Northeast Tank which also were within the "red zone" contour on the maps prepared by ETI (ETI, 1996). Chevron planned on doing below-foundation testing at 23 residences. The residents denied Chevron access to do this work.

##### **4.3.2 Methane Investigation at (b) (6)**

At each of the above residences, Chevron conducted soil gas surveys at locations marked by ETI that corresponded with the highest methane concentration from previous ETI surveys. Chevron had proposed to install gas monitor wells at the probe location with the highest methane value obtained at each of the three residences. The residents denied Chevron access to install these soil gas monitor wells. Sample locations are shown on Plate 1.

##### **4.3.3 Soil Gas Monitor Wells**

As part of the Phase 3 investigation, Chevron proposed to install three new soil gas wells, sample these wells, and sample the three existing soil gas monitor wells (SB-1, SB-2 and SB-3). Chevron was denied access by the residents to do this work.

#### 4.0 METHANE INVESTIGATION

Exploration Technology, Inc. (ETI), on behalf of the residents, has done an extensive soil gas survey for methane in the Kennedy Heights subdivision. This survey identified areas of elevated concentrations of methane. Chevron's field program was designed to: 1) delineate the lateral and vertical extent of areas where elevated methane concentrations were observed; 2) evaluate the volume of methane present at locations where high concentrations were observed; and, 3) collect data to allow a better understanding of methane genesis in the subsurface.

Much of the methane work proposed in Chevron's CWP was not completed because the residents limited access to the property. Chevron was allowed by the residents to conduct soil gas surveys in the former Northeast Tank at (b) (6). As a result, Chevron secured access from the City of Houston to conduct background sampling, to survey methane in the former Southeast Tank, and to investigate the potential for methane migration through utility line backfill. The methane investigation completed by Chevron is summarized in Table 4-1.

The Phase 3 field procedures for collecting methane samples were modified slightly from the Phase 1 methane investigation because of the frequent inability to withdraw vapors from the low permeability clays. During Phase 3, Chevron's methane subcontractor Transglobal Environmental Geochemistry (TEG) used an in-line digital pressure/vacuum gauge to indicate the amount of vacuum as the soil-gas probe was pulled from the hole. If the vacuum "broke" as the probe was being withdrawn, a soil-gas sample was collected from the open hole. In cases where the vacuum did not "break", indicating extremely tight formations, high vacuum (15 to 28 inches of mercury) was applied to the formation to try and force a sample, a similar approach to that used by ETI in their methane surveys. The forced sample was collected by pulling the plunger on a 60cc syringe to its full extent, closing off the valve to the formation, and allowing the plunger to be drawn partially back into the syringe, reaching atmospheric equilibrium. Ultimately, if vapor was recovered by this method it was drawn into a 5cc syringe and analyzed.

##### 4.1 Previous Investigations

Chevron's Phase 1 methane investigation was initiated in December 1995. Four soil gas monitoring wells were installed: three in the former Northeast Tank (SB-1, SB-2 and SB-3) and one on Cape Hyannis Drive (SB-4). These soil gas wells were sampled over a four-week period beginning on December 27, 1995. In addition, an initial soil gas survey was conducted December 12-16, 1995. Seventeen locations (SG-1 through SG-17) were sampled. A second field survey was conducted between February 12-15, 1996 at seven locations where ETI found their highest methane values.

connected to a gasoline-powered generator. While backhoes began excavating the water line, a heavy rain moved into the area and filled the excavation with water. A sample was collected ("Kennedy Heights @5022") from the excavation after most of the rain water and surface runoff were pumped from the hole. The leak appeared to be coming from an eight-inch steel water line about five to seven feet beneath ground surface. A purge water sample was collected ("Kennedy #1") that evening from a fire hydrant flush at (b) (6) (intersection with Brisbane). The repaired water line was observed to be leaking on September 20, 1996, and city crews again excavated around the leaking line. A second groundwater sample was collected ("Kennedy #2") from the excavation, and a second purge water sample collected from the nearby fire hydrant ("Kennedy #3").

The above water samples were analyzed for VOCs, SVOCs and TPH. The sample from the May 29, 1996 sampling event was analyzed by SASI in College Station, Texas. The September 1996 samples were analyzed by ITS in Baton Rouge, Louisiana. ITS also analyzed the samples for select metals.

### 3.5 Drinking Water Sampling Results

Background and drinking water sampling results are summarized in Table 3-4, and the laboratory reports for these samples are provided in Appendix I. Water-line break sampling results are presented in Table 3-5, and the corresponding laboratory data are found in Appendix J. Additional discussion on the quality of drinking water in the Kennedy Heights subdivision is in Exhibit A.

SVOCs, and TPH, as shown in Table 3-2. Table 3-3 lists the VOC and SVOC analytes reported for this investigation.

### 3.3 Baseline Drinking Water Sampling

As part of the Phase 3 investigation, drinking water samples were collected and analyzed from 13 selected residences. The residences are listed in Table 3-1 and shown on Figure 3-1. These residences were selected based on recommendations by Chevron's expert on water distribution systems. Before choosing these sampling points, City of Houston utility maps were reviewed and the water mains leading to and from the former Northeast Tank were identified. Chevron understands that the direction of water flow can change due to the pattern of water usage. The homes were selected to cover water flow in any direction in the neighborhood and to sample in areas that are potentially vulnerable to inadequate flushing. Samples were collected at the outside hose bib. For residences with more than one outdoor hose bib, the hose bib closest to the main water line was sampled, unless this hose bib was inoperable.

Eight rounds of drinking water samples were collected. The samples were analyzed for VOCs, SVOCs, and TPH, as shown in Table 3-2. Table 3-3 lists the VOC and SVOC analytes reported for this investigation.

### 3.4 Sampling after Water-Line Breaks

During this investigation, Fluor Daniel GTI attempted to have personnel on site when the City of Houston reported a water-line break at locations within or immediately adjacent to the former tanks. When possible, water samples were collected from the excavation where the line was being repaired and from the fire hydrant flush following the line repair.

Since May 1996, Chevron has sampled water-line breaks at two locations. The first sampling event occurred on May 29, 1996, when a water-line break was reported at (b) (6). City of Houston employees excavated a hole about three feet deep to isolate the leaking line, which appeared to be a two-inch line running from the main water line to the house. A sample was not collected because the line had been repaired by the time Fluor Daniel GTI arrived at the site and there was no water in the excavation to sample. After the line was repaired, the water line was flushed by opening a fire hydrant located at the southeast corner of Murr Way and the cul-de-sac along (b) (6). A sample of the water was collected from the fire hydrant flush and submitted to the laboratory for analyses.

On September 19, 1996, Chevron was notified by fax of a water line break at (b) (6). Upon arrival at the site, city workers were observed pumping water out of the hole with pumps

### 3.0 DRINKING WATER INVESTIGATION

A drinking water pathway for contaminant migration has been identified by the residents; consequently, Chevron included this potential pathway in its conceptual site model described in the CWP. Two potential mechanisms have been identified: 1) crude oil residuum that immediately enters the water-line break during repairs, is not flushed out of the system and travels directly to homes; and 2) crude oil residuum that enters the water-line system during repairs and is trapped within the lines and released slowly over time. To test these potential mechanisms, Chevron proposed a two-pronged approach: 1) immediately following a water-line break, sample the excavation, the fire-hydrant flush and selected homes; and 2) sample 13 selected homes near the former Northeast Tank two times a week for four weeks. No breaks occurred during the Phase 3 field investigation, so the hose bib testing immediately after a break could not be implemented.

#### 3.1 Previous Investigations

No drinking water samples were collected during Chevron's Phase 1 or 2 investigations. Chevron has reviewed previous tests of the drinking water by the City of Houston, the Kennedy Heights Civic Club, and ETI, the residents' environmental consultant. All these tests were non-detect for polynuclear aromatic hydrocarbons (PAHs). Beginning in about March 1996, Chevron began to inspect the Kennedy Heights neighborhood daily for water-line breaks and also receive notification via facsimile from the City of Houston when a water-line break was reported in the area. Chevron's program for sampling water in excavations and fire hydrant flushes is described in Section 3.4.

#### 3.2 Background Drinking Water Sampling

According to City of Houston personnel, the water source supplying the Kennedy Heights neighborhood comes from groundwater and surface water (personal communication with Ms. Beverly Halet, Acting Assistant Director of City of Houston, Water Quality Division, March 14, 1997). The groundwater well is reported to be located at 8003 Mykawa, northeast of Kennedy Heights and just north of Sims Bayou. Surface water is derived from the Trinity River and Lake Houston. The surface water and groundwater are mixed, stored and distributed from a facility at Federal Road and Clinton Drive.

After receiving permission from Ms. Halet, a background drinking water sample was collected on March 14, 1997 from a courthouse public restroom at 8300 Mykawa. This is located just south of 8003 Mykawa. The faucet was allowed to run several seconds, then drinking water samples were collected and submitted to ITS Laboratory for analysis. The samples were analyzed for VOCs ,

In the CWP, it was proposed that two rounds of groundwater samples be collected over a two-month period. Because of limited access to the wells, this was not possible. Exceptions to the sampling program as outlined in the CWP are listed below:

<u>Well ID</u>	<u># of Samples</u>	<u>Explanation</u>
SB-NE30	1	Sample collected from open borehole (SB-NE30) at residents request (12/6/96)
MW-NE30	2	First sample collected at residents' request before beginning well development (12/31/96); second sample collected after well development (01/06/97)
SB-NE30A	1	Sample collected from open borehole at residents' request (12/9/96)
MW-NW2,3&4	2	First sample collected before purging in case wells did not recover for subsequent sampling (12/31/96); second sample collected after wells purged dry and recovered (01/06/97)

The samples collected from borings SB-NE30 and SB-NE30A were submitted to AD Little Laboratory; the remaining groundwater samples were submitted to Inchcape Testing Services Laboratory (ITS). Groundwater samples submitted to ITS were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Total Petroleum Hydrocarbons (TPH), select metals (arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and vanadium), and other general water chemistry parameters (Table 2-5). Table 2-6 lists the VOC and SVOC analytes reported for the Phase 3 investigation.

## 2.6 Groundwater Sampling Results

Groundwater sampling results for VOCs, SVOCs, TPH, select metals, and general water chemistry parameters are presented in Tables 2-7 through 2-11, respectively. Laboratory data for the groundwater samples are provided in Appendix I. Additional discussion on the groundwater results is presented in Exhibit A.

CWP) and upgradient and downgradient monitor wells for the former Northwest Tank. These were not installed for three reasons: 1) Chevron did not have access to the properties needed to complete this work as proposed; 2) these wells could have been installed in city right-of-ways, but at increased safety risks to field personnel; and 3) groundwater results from wells completed beneath the former tank indicated no groundwater contamination.

### 2.3 Monitor Well Development

Monitor wells installed during Phase 3 were developed using the following methods. Wells completed in the uppermost transmissive zone were developed by manual surging (with a surge block) and pumping. Wells completed in fill material (MW-NE30 and MW-SE6) were developed by repeatedly surging with a bailer and bailing. The Phase 2 monitor wells installed during the spring of 1996 did not yield sufficient groundwater to allow development in accordance with SOPs. During Phase 3, these wells were generally purged once, then sampled after the well had recovered enough to collect a sample. Field records documenting well development and well purging activities are provided in Appendices D and E, respectively.

### 2.4 Slug Tests

Slug tests are a procedure for characterizing the hydraulic properties of low-permeability water-bearing zones. The procedure involves either raising or lowering the water level in the well with a slug of known volume. The rate at which the water falls or rises can be used to estimate the formation characteristics. Slug tests were performed on each of the wells installed in the uppermost transmissive zone. Slug test results are summarized in Table 2-3. Field data and graphs are presented in Appendix F.

### 2.5 Groundwater Sampling

The monitor wells in the Kennedy Heights area were first sampled during the Phase 3 field effort. No sampling was done during the Phase 2 investigation because the shallow wells did not yield a sufficient volume of water to sample at that time. During the Phase 3 field program, Chevron had access to monitor wells installed on residents' properties only between December 2, 1996 through January 10, 1997, and no access to MW-NW1 and MW-NW5 on the (b) (6) property. Consequently, the proposed field program was modified to gather as much groundwater information as possible while Chevron had access to these wells.

Before sampling, several rounds of fluid level measurements were taken. These measurements were taken with an oil/water interface probe. The presence of free-phase hydrocarbons was not observed in any of the monitor wells. Water-level measurements are summarized in Table 2-4.

## 2.0 GROUNDWATER INVESTIGATION

Chevron's groundwater program was designed to characterize the site hydrogeology and delineate the horizontal and vertical extent of groundwater impacts, if encountered. The data gathered during this program were used to complete Chevron's characterization of the site conditions and to prepare a baseline human health and environmental risk assessment.

During the Phase 2 and 3 investigations, 23 groundwater monitor wells were installed in the Kennedy Heights subdivision. Groundwater data were also collected in January 1997 from three soil gas monitor wells (SB-1, SB-2 and SB-3), which were installed in the former Northeast Tank in December 1995 (see Section 4.1). Completion information for these monitor wells is provided in Table 2-1. Locations of wells installed in the former Northeast, Northwest and Southeast Tanks are shown on Plates 1, 2 and 3 and Figures 2-1, 2-2 and 2-3, respectively. Monitor well completion diagrams are provided in Appendix B.

Cone penetrometer soundings (CPTs) were used as a tool to characterize the site geology and identify potential transmissive zones in the shallow subsurface (i.e., less than 50 feet). The Phase 2 and 3 CPTs are listed in Table 2-2. CPT locations are shown on Plates 1, 2 and 3, and CPT logs are provided in Appendix C.

### 2.1 Previous Investigations

During the Phase 2 investigation, 10 monitor wells were installed. Five shallow wells were installed in the former Northeast Tank and five shallow wells were installed in the former Northwest Tank. These wells were generally completed to a depth of about five to six feet and screened in clayey fill material above the base of the former tanks. The purpose of these wells was to evaluate the shallow groundwater chemistry. The wells were not developed or sampled during Phase 2 because they were either dry or had insufficient water for sampling.

### 2.2 Monitor Well Installation

During the Phase 3 investigation, 13 monitor wells were installed. To characterize groundwater conditions beneath the former Northeast Tank, eight wells were completed in the uppermost transmissive zone (about 25 feet beneath ground surface). One shallow well, MW-NE30, was completed in fill material at (b) (6). In the former Northwest Tank, three wells were installed in the uppermost transmissive zone. One shallow well was completed in fill material in the former Southeast Tank.

In the CWP, Chevron proposed to install two wells on the (b) (6) property (see Figure 2-2 of the

only as a cattle ranch up to 1968. This is consistent with the documents discovered to date, which show the property was leased by Gulf for cattle grazing.

The aerial photographs also show that between 1930 and 1968 the external access to the property was restricted by fences on all sides. There were also drainage ditches on the east of the property and south of Selinsky Road. This visible evidence of restricted access is consistent with the documentary record, as the grazing leases require the lessees to maintain the fences around the property (which would also be required to keep the cattle from leaving the property.) Review of the aerial photographs also show cattle visible on the property in at least five aerial photographs. There is no evidence in this period of vehicle tracks across the property or of any dumping taking place on the property.

By the early 1960s development in Houston had reached this area. Aerial photographs show that subdivisions were being developed on three sides of the property. In 1968 the property was sold by Gulf to Log Development. Log Development thereafter closed the tank areas by pushing the berms into the center of the tanks. Homes were built over the Northeast and Southeast (water) tanks. The former Northwest Tank remains undeveloped today. Aerial photographs show healthy vegetation in the area, both within and outside the former tank areas.

In 1986, some 18 years after this property had been sold by Gulf, Chevron became the successor to Gulf.

#### 1.4 Site History

This site history is derived from the records of the Gulf companies, interviews of people who lived in the area and review of public record documents, such as newspaper accounts, agency records and aerial photographs. The aerial photo review was performed by Dr. Roy W. Hann, Jr., who has prepared a written report of his findings (Exhibit A). Dr. Hann reviewed over 100 aerial photographs of the site from 1930 (the earliest aerial photograph available) through 1996. The photographs reviewed by Dr. Hann are set out in his report (Figure 1-2 through 1-7).

Gulf Pipeline acquired the approximately 130 acre-site that is now the Kennedy Heights subdivision by deed dated September 6, 1921. In this time period Gulf had production at a number of nearby fields, including Pierce Junction Field, which was approximately 2.5 miles northwest of this property. Gulf had a pipeline that passed near this property and used the facility as a transfer station. Three large earthen tanks were constructed on the property in 1921 and are visible on the 1930 aerial photograph. It appears that Gulf Pipeline used the site between 1921 and 1927 as a facility where pipeline quality crude oil was stored incident to the transportation of the oil. This usage ended in 1926 or 1927. A search of archived records of the Texas Railroad Commission do not show that Gulf was ever cited for violations of applicable regulations at this property.

The two northern tanks were reported to have been used for storage of crude oil. These tanks had wooden roofs. The former Southeast Tank was reported not to have been used for crude oil storage and reportedly held only fresh water. Gulf also had a house on the site occupied by the (b) (6) family, whose sons grew up on the property, and have been a primary source of the site history. The aerial photographs also show a building in the center of the property that was possibly a pump house.

In 1927 the facility was damaged by a wind storm, including severe damage to the roofs over the two northern tanks. The facility was not used after that date. Reportedly the remaining oil was pumped out of the tanks after the facility ceased to be used. Thereafter the tanks sat open and held water. The property was used for raising cattle by the (b) (6) and others and cattle drank from the tanks. The tanks also had fish and were used for swimming. (b) (6), who grew up on the property and swam in the tanks, reports that the two northern tanks did not have visible oil residue, and that the cattle suffered no ill effects from drinking the water in the tanks.

Review of the aerial photographs shows that the property was not used for oil & gas activities after 1930, the earliest date for which aerial photographs are available. There is also no evidence of any visible damage to the property that might be associated with any oil spill, salt brine spill or hazardous material dumping on the property. The aerial photographs show the property was used

- Petroleum Contamination in Soils: Report prepared for Kennedy Heights Civic Committee; prepared by HNU Environmental Services, Inc. (March 1993)
- Law Report to Houston's American Home Dream Program I, Inc. (March 1994)
- Kennedy Heights Data Reports prepared for residents by Exploration Technologies, Inc.
- Depositions taken in preparation for litigation.

Chevron has reviewed data from the above reports and, where appropriate, used this information in developing work plans for the site.

### 1.3 Report Organization

The following sections describe the field and laboratory investigations for each of the three phases of work conducted by Chevron. Summaries of work are provided for each of the four potential exposure pathways identified in the conceptual model for the site: groundwater (Section 2.0), drinking water (Section 3.0), air (Section 4.0), and soils (Section 5.0). For each pathway, the Phase 1 and 2 investigations are summarized first, followed by a description of the Phase 3 work as described in Chevron's CWP. Field activities were completed in accordance with the Standard Operating Procedures (SOPs) provided in the corresponding work plan for each phase of work, unless noted otherwise. Locations of field activities conducted by Chevron in and around the former tanks are shown on Plates 1, 2 and 3. Survey data for these locations are found in Appendix A. The physical characteristics of the study area are provided in Section 6.0. Project QA/QC is discussed in Section 7.0. References are in Section 8.0.

Laboratory reports and quantification data for the Phase 1 and Phase 2 investigations have been previously submitted to the RRC (SASI, 1996 and GWSR, 1996) and have not been re-submitted with this report. Other types of data from the previous investigations, such as monitor well completion diagrams and boring logs, have been included in this report for the sake of convenience to the reader. Field-related data are provided in Appendices A through H. Laboratory-related reports are provided in Appendices I through M. The body of this report, for the most part, summarizes the data collected by Chevron during the Phase 1, 2 and 3 investigations.

- Investigation results provided in report "The Measurement of Methane Concentrations and Flux Rates from Soil at the Kennedy Heights Subdivision to the Railroad Commission of Texas" dated February 1996. Report prepared by Soil Analytical Services, Inc. (SASI, 1996).

**PHASE 2      Soil and Groundwater Investigation      Field Work 03/96-05/96**

- Scope of work described in "Work Plan for Site Assessment, Kennedy Heights Subdivision, Houston, Texas" dated March 8, 1996.
- Investigation results presented in report "Interim Report on Kennedy Heights Field Investigation" dated May 31, 1996. Report prepared by Gardere, Wynne, Sewell, and Riggs (GWSR, 1996). (VOC and SVOC data on soils subsequently withdrawn per letter dated November 27, 1996).

**PHASE 3      Comprehensive Investigation      Field Work 12/96 - 03/97**

- Scope of work described in work plan called "Comprehensive Work Plan (CWP) for Kennedy Heights Subdivision, Houston, Texas" dated December 17, 1996.
- Data presented in this report.

Field work was completed under the supervision of Fluor Daniel GTI, Chevron's environmental consultant on this project. The information generated as a result of the above efforts has been summarized in this report.

Each phase of Chevron's investigation was done under the direction of a work plan reviewed and commented on by the Railroad Commission of Texas (RRC) staff. Before Chevron initiated any field activity, the RRC and the residents were notified. The purpose of the notification was to allow the RRC staff to observe each field activity and evaluate if the work was done as proposed in the work plans previously submitted to and reviewed by the RRC. The RRC and the residents were also given the opportunity to split each sample collected by Chevron, unless there was insufficient sample volume to split.

Other consultants not working for Chevron have also conducted site investigations or provided opinions regarding site conditions, as listed below:

- Verbal report to City of Houston of odors in subsurface oil at Kennedy Heights (Pas-Key Construction Service, Inc., 1991)
- LAN Report to City of Houston (December 1991)

## 1.0 INTRODUCTION

This report documents Chevron's efforts to characterize site conditions for the former earthen crude oil storage tanks in the Kennedy Heights subdivision. Three former tanks were investigated: the former Northeast Tank, the former Northwest Tank and the former Southeast Tank. The former tank locations and the general layout of the Kennedy Heights subdivision are shown in Figure 1-1.

The primary purposes of this investigation were to:

- 1) delineate the horizontal and vertical extent of residual crude oil in soil and potential effect on groundwater;
- 2) investigate claims of phase-separated hydrocarbons;
- 3) evaluate the potential effects of residual crude oil on the residents' drinking water supply, and;
- 4) assess levels of methane in the subsurface soils in Kennedy Heights and background areas.

### 1.1 Site Description

The three former earthen storage tanks are located in southern Harris County, about one mile south of the intersection of Airport Boulevard and Cullen Boulevard, in the Kennedy Heights subdivision (Figure 1-1). The former tanks are referred to as the Northwest Tank, the Northeast Tank, and the Southeast Tank. Residences within the Kennedy Heights subdivision have been built over the former Northeast and Southeast Tanks. No residences or other buildings are located over the former Northwest Tank.

### 1.2 Previous Investigations

Chevron's field investigation of the Kennedy Heights subdivision has occurred primarily in three phases, as described below.

#### PHASE 1 Methane Investigation

Field Work 12/95 - 02/96

- Scope of work outlined in proposal "Installation of Gas Monitoring Wells for the Measurement of Methane Concentrations and Flux Rates from Soil, Kennedy Heights Subdivision, Houston, Texas" dated December 1995.

For the drinking water investigation, Chevron collected one background sample and eight rounds of drinking water samples from 13 residences. The 110 drinking water samples were analyzed for VOCs (5 analytes), SVOCs (18 analytes), and TPH. Five samples were collected from water-line breaks at two locations and analyzed for VOCs (50 analytes), SVOCs (60 analytes), TPH, and metals (10).

For the methane investigation, a total of 46 soil gas locations were probed to characterize background conditions and 98 soil gas locations were probed in the former tank areas. From these borings, 650 methane tests were done. Three vapor samples and two soil samples were radiocarbon dated. The saturated field hydraulic conductivity of shallow soils was measured at five locations using a Guelph permeameter.

For the soils investigation, Chevron collected soil samples from 192 locations. From these locations, a total of 815 samples were collected. These 815 samples were analyzed for VOCs (64 analytes), SVOCs (60 analytes), TPH, and select metals (10). A subset of the samples was analyzed for SPLP metals, the modified 8015 Massachusetts Method, and alkylated PAH analyses, as well as analyses of total organic carbon and major ions.

This report summarizes the field programs and presents the data collected during the Phase 1, 2 and 3 investigations. Exhibit A contains a summary of the data, a discussion on the significance of the results, including review of the conceptual model, and reports from Chevron's experts. The expert reports include the original reports previously submitted, certain updates based on the results of the Phase 3 investigation, and a risk assessment.

## EXECUTIVE SUMMARY

Between December 1995 and March 1997, Chevron completed an extensive investigation of three former earthen storage tanks in the Kennedy Heights subdivision. The three former tanks are located in southern Harris County, about one mile south of the intersection of Airport Boulevard and Cullen Boulevard, in the Kennedy Heights subdivision. The primary purposes of the investigation were to characterize the site conditions and collect sufficient data to support a baseline risk assessment, which will evaluate if the former tanks present a threat to human health or the environment.

Gulf Pipeline acquired the approximately 130-acre site that is now known as the Kennedy Heights subdivision in the early 1920s. The former Northeast and Northwest Tanks stored crude oil for several years in the 1920s, then held fresh water after the tanks were drained of oil and taken out of service in 1927. The former Southeast Tank stored fresh water only. After 1927 the tanks were used as stock tanks for cattle. The tanks were also used for fishing and swimming. In 1968, the property was sold by Gulf to Log Development. Log Development thereafter closed the tank areas by pushing the tank berms into the center of the tank. Homes were built over the former Northeast and Southeast Tanks. The former Northwest Tank remains undeveloped today.

Chevron's investigation of the site occurred in three phases. Phase 1 field work was done between December 1995 and February 1996. The work primarily involved investigation of methane in the former Northeast Tank. In Phase 2, which occurred between March and May 1996, a soil and groundwater investigation was conducted. Much of the volatile and semi-volatile soils data collected during this phase of work failed QA/QC and were withdrawn. Therefore, the Phase 3 scope of work, which was implemented between December 1996 and March 1997, included re-collecting most of the soils data obtained during Phase 2, as well as additional investigation in the areas of groundwater, drinking water, and methane. The scope of work for the Phase 3 investigation was based on data needs identified in Chevron's conceptual site model, which was developed as part of the Phase 3 work plan.

For the groundwater investigation, Chevron collected a total of 28 samples from 23 groundwater monitor wells and 3 soil gas monitor wells. The 28 samples were analyzed for VOCs (48 analytes), SVOCs (59 analytes), TPH, select metals (10), and general groundwater parameters (10). Slug tests were done on 11 groundwater monitor wells completed in the uppermost transmissive zone.

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**RESULTS OF FIELD INVESTIGATION  
FOR KENNEDY HEIGHTS SUBDIVISION  
HOUSTON, TEXAS**

*April 3, 1997*

*Prepared for:*

**Chevron U.S.A. Production Company  
1301 McKinney  
Houston, Texas 77010**

*Prepared by:*

**Fluor Daniel GTI  
505 E. Huntland Drive Ste 550  
Austin, Texas 78752**

**FLUOR DANIEL GTI** 



# **Results of Field Investigation**

Kennedy Heights Subdivision, Houston, Texas

*Volume 1*



#### **REFERENCE 4**

### **REFERENCE 3**

# **SUPERFUND CHEMICAL DATA MATRIX**

## **APPENDIX B TABLES**

**June 1994**

**02 002**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JUN 30 1994

OFFICE OF  
SOLID WASTE AND EMERGENCY  
RESPONSE

MEMORANDUM

SUBJECT: Superfund Chemical Data Matrix (SCDM)  
FROM: Janet Grubbs, Chief  
Site Assessment Branch  
TO: Site Assessment Section Chiefs  
Regions I-X

Attached is the revised Superfund Chemical Data Matrix (SCDM). These tables, which replace the March 1993 version of SCDM, are to be used when evaluating sites with the Hazard Ranking System (HRS). You will note that values which have changed from the previous version of SCDM are marked with an asterisk in the tables. To further assist you in updating packages which are currently being prepared, I am attaching a separate list of the values which have changed.

There is one change which I would like to specifically note. In the June 1994 SCDM, we have included a benchmark for lead in drinking water. Since the former MCL of 50  $\mu\text{g}/\text{l}$  was rescinded in November of 1992, we have included the action level of 15  $\mu\text{g}/\text{l}$  which is the standard used by the drinking water program to monitor water quality at the tap.

Questions about SCDM may be directed to Trish Gowland at (703) 303-9017.

Attachments

cc: SAB Section Chiefs  
S. Lee  
B. Means  
T. Gowland  
A. Carpien

02 00



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## **REFERENCE 2**

12-14-90

Vol. 55

No. 241

# Federal Register

Friday  
December 14, 1990

Book 2

United States  
Government  
Printing Office

SUPERINTENDENT  
OF DOCUMENTS  
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OFFICIAL BUSINESS  
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SECOND CLASS NEWSPAPER

Postage and Fees Paid  
U.S. Government Printing Office  
(ISSN 0097-6326)

## **REFERENCE 1**

## PA DOCUMENTATION LOG SHEET

**SITE:** KENNEDY HEIGHTS

**CITY:** HOUSTON

**STATE:** TEXAS

REFERENCE NUMBER	DESCRIPTION OF THE REFERENCE
1	U.S. Environmental Protection Agency. Final Rule Hazard Ranking System. FR 51532-51667. December 14, 1990.
2	Superfund Chemical Data Matrix. Appendices B-1, B-2, and C. June 1994.
3	U.S. Geographical Survey Topographical Maps of Texas: Park Place, 1982, Pearland, 1982, Almeda, 1982, and Bellaire, 1982.
4	Results of Field Investigation, Kennedy Heights Subdivision, Houston, Texas. Prepared by Flour Daniel GTI for Chevron U.S.A. Production Company. April 3, 1997.
5	Ground-Water Withdrawals and Changes in Ground-Water Levels, Ground-Water Quality, and Land-Surface Subsidence in the Houston District, Texas, 1980-84. U.S. Geological Survey Water-Resource Investigations Report 87-4153. Prepared in cooperation with the City of Houston and the Harris-Galveston Coastal Subsidence District. 1987.
6	EDR-Radius Map with Geo-Check for Kennedy Heights Subdivision. August 25, 1997.
7	Report of Phase I-Additional Research and Limited Phase II-Field Sampling and Laboratory Testing for 53 Lots in Kennedy Heights Subdivision, Section 3. Prepared by Law Environmental, Inc. for Houston's American Home Dream Program I, Inc. March 1994.
8	Environmental Investigation of Subsurface Hydrocarbon Contamination for Kennedy Heights Subdivision. Prepared by Exploration Technologies, Inc. for O'Quinn, Kerensky, McAninch & Laminack, Houston, Texas. October 1, 1996.
9	Letter. HRS Net Precipitation Values. From: Andrew M. Platt, Group Leader, MITRE Corporation. To Lucy Sibold, EPA. May 26, 1988.

- 10 Letter. *Texas' Wellhead Protection Program*. To: Alex Zocchi, ICF Kaiser Engineers. From: David P. Terry, Ground Water Section, Texas Water Commission. July 15, 1991.
- 11 Herschfield, David M. "Rainfall Frequency Atlas of the United States". U.S. Weather Bureau Technical Paper No. 40. 1961.
- 12 U.S. Department of Commerce, Bureau of the Census. *Current Population Reports, Special Studies, Series P-23, No. 156. Estimates of Households, for Counties: July 1, 1985.*
- 13 Record of Communication. City of Houston Public Water System. To: Innocent Ohalet, City of Houston, Public Utilities. From: Johnny Kennedy, SSDAT, Texas Natural Resource Conservation Commission. October 14, 1995.
- 14 Memorandum. Possible Methane Generation. To: Susan Webster, EPA Region 6 Response and Prevention Branch. From: Kristine Lloyd, EPA Region 6, Superfund Technical Assessment and Response Team. December 30, 1997.



**LAW**

ENGINEERING AND ENVIRONMENTAL SERVICES

**REPORT OF PHASE I-ADDITIONAL RESEARCH  
AND LIMITED PHASE II-FIELD SAMPLING  
AND LABORATORY TESTING**

**53 LOTS IN KENNEDY HEIGHTS SUBDIVISION,  
SECTION 3  
Houston, Texas**

**Submitted to:**

**HOUSTON'S AMERICAN HOME DREAM PROGRAM I, INC.  
2600 South Loop West, Suite 275  
Houston, Texas 77054**

**Law Environmental, Inc.  
Houston, Texas**

**March, 1994**

**Project 71-3646**

**KH-H 011525**

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## **REFERENCE 7**

**GEOCHECK VERSION 2.1**  
**STATE DATABASE WELL INFORMATION**

with 54 ft drawdown when drilled.

## **1.0 INTRODUCTION**

The Region 6 Superfund Technical Assessment and Response Team (START) contractor, Ecology and Environment, Inc., (E & E) was tasked by the U. S. Environmental Protection Agency (EPA) under Contract Number 68-WO-0037 to conduct the Preliminary Assessment (PA) of Kennedy Heights site.

### **1.1 PRELIMINARY ASSESSMENT OBJECTIVES**

The purpose of a PA is to determine whether further investigations are warranted and to screen sites for further consideration under CERCLA.

The PA investigation determines CERCLA eligibility, reviews file information, documents the presence and type, or absence, of area receptors and uncontained or uncontrolled hazardous substances on-site and off-site, and documents site characteristics. Information obtained during the Preliminary Assessment supports the management decision of whether the site warrants immediate removal action, proceeds to site inspection (SI) or receives the classification of No Further Remedial Action Planned (NFRAP) under the Superfund Amendments and Reauthorization Act (SARA).

## **2.0 SITE DESCRIPTION AND OPERATIONAL HISTORY**

This section addresses operational history, waste containment, hazardous substance identification, and regulatory status of the facility.

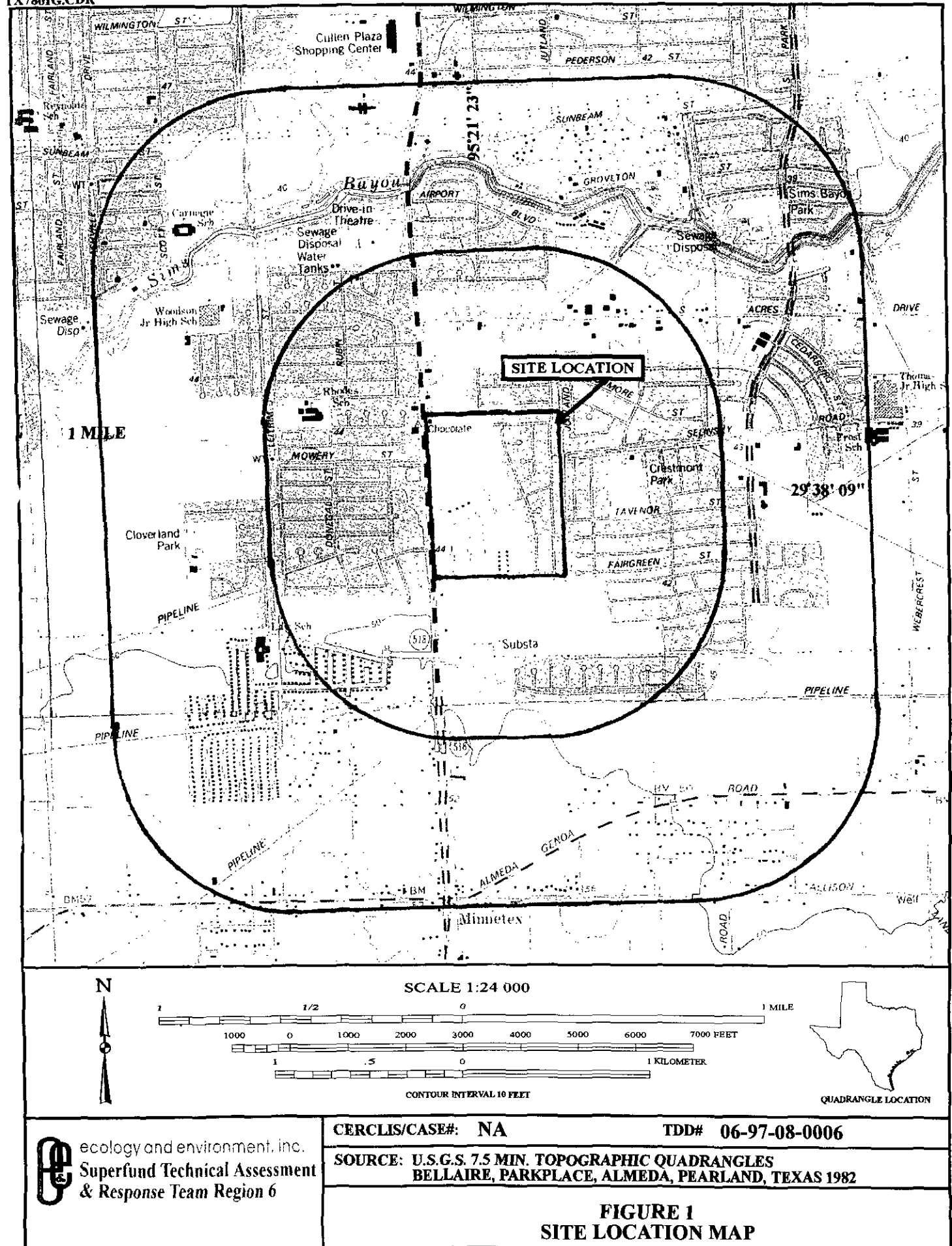
### **2.1 SITE LOCATION**

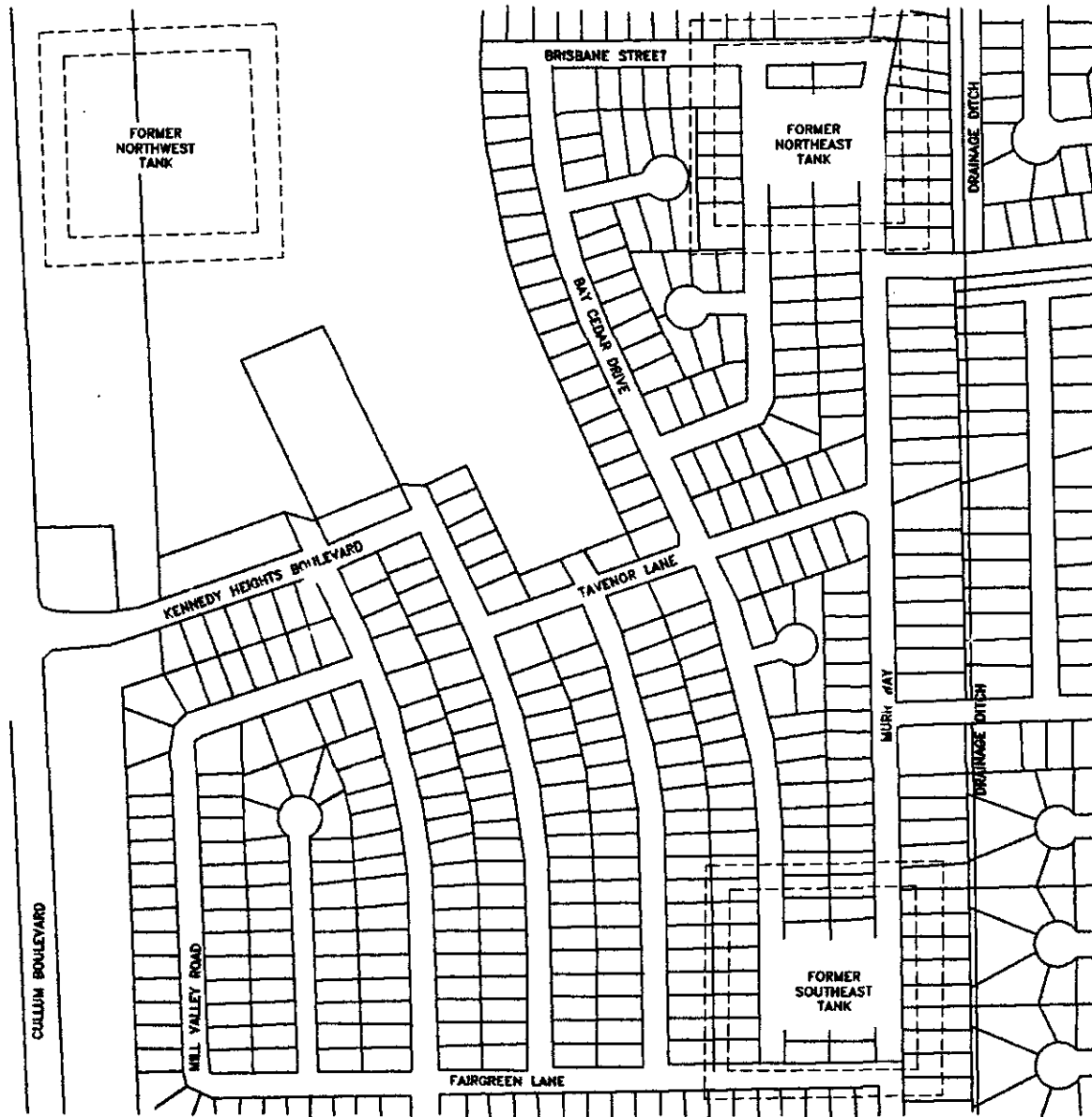
The Kennedy Heights site is located approximately 1 mile south of the intersection of Airport Boulevard and Cullen Boulevard in southern Harris County, Texas. The geographical coordinates of the site are 29°38' 09" north latitude and 95°21'23" west longitude (Figure 1). The coordinates were measured from the center of the site on a United States Geographical States (U.S.G.S.) topographic map using a 5-second template.

The property encompasses approximately 130 acres (Ref. 4, p. 4). The site is bound by Selinsky road to the north, an intermittent drainage ditch to the east, Schnur Park to the south, and Cullen Boulevard to the west (Ref. 3). The site is primarily residential except for the northwestern section of the site, which remains undeveloped (Ref. 4, p. 1). (Figure 2).

Properties surrounding the site include residential, commercial, and industrial properties.

Several properties with underground storage tanks (USTs) that store gasoline are located on Cullen Boulevard (Ref. 6). Two properties listed on the Texas Natural Resource Conservation





0 400 800  
APPROXIMATE SCALE IN FEET

**ecology and environment, inc.**  
Dallas, Texas  
International Specialists in the Environment

**FIGURE 2**  
**SITE SKETCH**  
**KENNEDY HEIGHTS, HOUSTON, TX**

TDD# 06-97-08-0006

Date: AUGUST 28, 1997

PAN# 037801SAXX

P.M.: K. LLOYD

Commission (TNRCC's) leaking petroleum storage tank (LPST) database are located west and southwest approximately 1/8 mile from the site (Ref. 6, p. 2).

## **2.2 OPERATIONAL HISTORY/SITE DESCRIPTION**

Three former earthen storage tanks were located on the site from 1921 until 1968 (Ref. 4, p. 4). Gulf Pipeline acquired the approximately 130-acre site that is now the Kennedy Heights subdivision by deed on September 6, 1921. Gulf Pipeline used the property as a transfer station for crude oil piped in from a number of nearby fields. Three earthen tanks were constructed on the property in 1921. According to historical aerial photographic analysis performed by a contractor, the tanks were used between 1921 and 1927 as a facility where crude oil was stored prior to oil transportation (Ref. 4, p. 4).

The two northern tanks were reportedly used for crude oil storage. These tanks had wooden roofs. The southeast tank reportedly stored fresh water or salt water (Ref. 4, p. 4; Ref. 8, p. 2). A residence and possibly a pump house were located on the property.

In 1927, the tanks were damaged by a windstorm, including severe damage to the wooden roofs of the northern tanks. The tanks were not used after the wind damage. The remaining oil was reportedly pumped out of the tanks and the property was no longer used for oil storage. The tanks stored accumulated water. The property was then used for raising cattle. The tanks were used for drinking water by the cattle and used for swimming by local residents (Ref. 4, p. 4).

According to aerial photographic analyses, the property was not used for oil and gas activities after 1930, the earliest date for which aerial photographs are available. No evidence of visible damage to the property from oil spills, salt brine or hazardous material dumping was noted on the 1930 aerial photograph (Ref. 4, p. 4). The property was used for cattle grazing until 1968.

In the early 1960s, development had reached this area of Houston. Aerial photographs indicate that the area on three sides of the property was being developed. In 1968, the property was sold to Log Development. Log Development closed the tank areas by pushing the berms into the tanks. Homes were built on the former locations of the northeast and southeast tanks. The former location of the northwest tank remains undeveloped (Ref. 4, p. 5). Chevron purchased Gulf in 1986, 18 years after the property had been sold by Gulf.

## **2.3 ERB/REMOVAL CONSIDERATIONS**

No actual or potential exposure to nearby humans, animals, or food chain from hazardous substances, pollutants, or contaminants was noted during the file review. Elevated methane concentrations from soil vapor analyses have been reported in the previous studies that have been conducted at the site (Ref. 4; Ref. 7; Ref. 8). Evaluation of the soil vapor samples does not indicate widespread areas of methane contamination at the site, instead small isolated pockets of methane are more likely to be present. High methane concentrations detected in samples collected by the resident's contractor may not be representative of soil conditions due to the high vacuum conditions used to collect the sample. (Ref 14).

## **2.4 REGULATORY STATUS/ACTIVITIES**

According to the file review, Gulf was never cited by the Texas Railroad Commission (TRCC) for violations of any applicable regulations when the tanks were on site (Ref. 4, p. 4). The TRCC issued an order to cease use of open pits for crude oil storage in 1939. Based on the aerial photograph analyses, the tanks appeared to be used for storm water control between 1955 and 1956 (Ref. 6, pp. 9-10).

## **2.5 SOURCE EVALUATION AND HAZARDOUS SUBSTANCE IDENTIFICATION**

The potential source identified at the site is the soils at the former area of the earthen tanks. The tanks were present from approximately 1927 through 1968 (Ref. 4, p. 4). Crude oil was stored in two of the tanks and salt water was stored in the third tank (Ref. 4, p. 4; Ref. 8, p. 4). There is no documentation to indicate that the tanks were lined. The exact dimensions of the former tanks are not documented. According to the figures provided in Reference 4, the tanks each measured approximately 430 feet by 430 feet (Ref. 4, Figures 2-1, 2-2, and 2-3).

Analytical sampling of subsurface soils from the former tank areas conducted by contractors for the citizens of the Kennedy Heights subdivision indicated the presence of total petroleum hydrocarbons (TPHs) (Ref. 8).

### **3.0 PATHWAY ASSESSMENT**

This section characterizes the environmental pathways and associated targets of contaminant migration from the facility.

#### **3.1 GROUND WATER PATHWAY**

##### **3.1.1 Ground Water Characteristics**

The geohydrologic units in the site area are the Chicot and Evangeline aquifers (Ref. 5, p. 3).

The aquifers are composed of sedimentary deposits in the Coastal Plain physiographic province (Ref. 5, p. 3).

The Chicot aquifer includes all deposits from the land surface to the top of the Evangeline aquifer. The Chicot aquifer is composed of the Willis Sand, Bentley Formation, Montgomery Formation, Beaumont Formation, and Quaternary alluvium (Ref. 5, p. 3). The base of the Chicot is approximately 500 to 600 feet below ground surface (bgs)(Ref. 5, Figure 3). The Chicot is under artesian conditions in this area (Ref. 5, p. 3).

The Evangeline aquifer is composed of the Goliad Sand and the upper part of the Fleming formation. It is similar in lithology to the Chicot aquifer (Ref. 5, p. 10). The base of the

Evangeline aquifer is approximately 2,000 feet bgs (Ref. 5, Figure 4). The Evangeline aquifer is the major source of ground water in the Houston area (Ref. 5, p. 10).

The annual net precipitation for the area as measured at Houston Intercontinental Airport is 12.30 inches (Ref. 9).

#### Site-Specific Hydrology

A silty sand and silty clay unit was located about 25 feet bgs across most of the site and is the uppermost unit capable of transmitting usable quantities of water (Ref. 4, p. 22). Monitoring wells have been installed and sampled by the contractor for the citizens of Kennedy Heights.

#### **3.1.2 Ground Water Receptors**

Four drinking water wells were identified within a 1-mile radius of the site (Ref. 6, pp. A1-A10).

The nearest drinking water well is located approximately ½ mile north of the site and is 578 feet bgs in the Chicot aquifer (Ref. 6, p. A2). The City of Houston's public water supply is a blended system that utilizes 54% surface water and 46% ground water. The population served by the system is 1,583,000 (Ref. 3). The City of Houston has a designated Wellhead Protection Area established (Ref. 10).

## **3.2 SURFACE WATER PATHWAY**

### **3.2.1 Surface Water Characteristics**

Surface water from the site enters into storm water drains within the subdivision. The storm water system drainage is not known.

An intermittent drainage ditch is located east of Murr Way, which drains north for approximately 3,800 feet into Sims Bayou, the probable point of entry (Ref. 3). Sims Bayou flows into Buffalo Bayou /Houston Ship Channel (Ref. 3). The Houston Ship Channel is tidally influenced and receives industrial and municipal runoff.

The site is located on the soils of the Lake Charles Urban Part series. This series consists of deep, poorly drained, clayey soils and has low permeability (Ref. 4, p. 20; Ref. 8, p. 7).

The two-year, 24-hour rainfall is approximately 5.0 inches (Ref. 11). The upgradient drainage is the area of the site, which is approximately 130 acres (Ref. 3). The site is located in a 100- and 500-year floodplain (Ref. 6).

### **3.2.2 Surface Water Receptors**

Sims Bayou is located in an urban area of Houston. The resource use of Sims Bayou is not

known at this time; however, it is assumed that local residents may fish the bayou.

### **3.3 GROUND WATER RELEASE TO SURFACE WATER PATHWAY**

The depth to ground water in the vicinity of the site is approximately 4 to 6 feet below ground surface (Ref. 4, p. 22). The surface water elevation at a footbridge at Murr Way was approximately 10 feet below natural grade (Ref. 4, p. 22). Additional information would need to be obtained to determine if the criteria for the pathway have been met (Ref. 1).

### **3.4 SOIL EXPOSURE PATHWAY**

Visual evidence of stained soil has been documented by city contractors when excavating for a leaking pipeline (Ref. 7; Ref. 8, p. 5). The stained soil was noted at a depth of approximately 6 feet below ground surface (Ref. 7, p. 9).

Analytical results of soil samples from at the site show that target compounds were detected in samples collected at depths two feet or greater below ground surface.

#### **3.4.1 Resident Threat Receptors**

There are approximately 356 homes located on the site (Ref. 7). Using the estimated population per household in Harris County of 2.87, the estimated population on-site is 1,021 (Ref. 12).

There are no documented schools or daycare centers located within 200 feet of the site (Ref. 3). No commercial agriculture, silviculture or livestock production or grazing occurs on the site (Ref. 4). Since the site is located in an urban area, it is assumed that there are no terrestrial sensitive environments on site.

#### **3.4.2 Nearby Threat Receptor**

The site is a residential subdivision and is accessible to the public (Ref. 4; Ref. 8). The population residing within the 1-mile travel distance was estimated by counting the number of houses within each target radii and using the 1985 census data of Harris County (Ref. 3; Ref. 12). The estimated population within the 0- to ¼-mile radius is 1,500; within the ¼- to ½-mile radius is 1,800; and within the ½- to 1-mile radius is 3,500.

Two schools are located within ¼ mile from the site (Ref. 4).

### **3.5 AIR**

#### **3.5.1 Air Pathway Characteristics**

No air samples have been collected during previous site activities (Ref. 4; Ref. 7; Ref. 8). Soil vapor analyses have been conducted on boreholes throughout the site. Methane has been reported at concentration ranging from 25,000 to 480,000 parts per million (ppm) in samples

collected by the residents' contractors (Ref. 8). Methane is not listed in the Superfund Chemical Data Matrix (SCDM)(Ref. 2).

### **3.5.2 Air Receptors**

The nearest regularly occupied buildings are the homes located on-site. The population within the remaining target distance limits (TDLs) was determined by counting the number of homes in each TDL and multiplying the number by the estimated population per household in Harris County (Ref. 3; Ref. 12). The population residing within the 0- to ¼-mile of the site is approximately 2,521; ¼- to ½-mile is 1,800; ½- to 1-mile is 3,500; 1- to 2-mile is 5,000; 2- to 3-miles is 7,000 and 3- to 4-mile is 11,000 (Ref. 3; Ref. 12). Two schools were identified within the ¼-mile radius (Ref. 3).

Twelve schools were identified between two and four miles from the site (Ref. 3). It is not known if sensitive environments exist within the four-mile target distance limit.

#### 4.0 SUMMARY

Three former earthen tanks that stored crude oil and salt water were located at the site now known as the Kennedy Heights subdivision. Numerous sampling investigations have been conducted on the site to characterize and delineate subsurface soil and shallow ground water contamination at the site. The analytical data indicates that some petroleum-related substances are present in the subsurface soils at depths of two feet or greater below ground surface.

The ground water pathway is not of concern since drinking water wells are located at depth of 500 feet or greater bgs. The surface water pathway is not of concern due to the low number of potential targets within the pathway.

The soil exposure pathway is not of concern since contamination has been detected at a depth of two feet or greater.

The following data gaps were identified during the Preliminary Assessment of Kennedy Heights:

- The existence of sensitive environments within the 4-mile target distance limit;
- The exact number of drinking water wells located within each target distance limit;  
and
- The enrollment of the schools within the target distance limits.

## EXECUTIVE SUMMARY

Law Environmental, Inc. was contracted by Houston's American Home Dream Program I, Inc. to perform Phase I-Additional Research and Limited Phase II-Field Sampling and Laboratory Testing on approximately 10 acres of land in Section 3 of the Kennedy Heights subdivision, Houston, Harris County, Texas (Figure 1). Our services were provided in general accordance with Law Environmental Proposal No. 71-4045, dated February 18, 1994, which was accepted on February 18, 1994 by Sid F. Stephenson. The scope of work was verbally discussed with Ms. Mary Ellen Whitworth of the City of Houston on February 18, 1994. This work complements a prior Limited Preliminary Environmental Liability Assessment report (Law Project No. 71-3646, dated September 23, 1993). The subject site is located to the northeast of the intersection of Cullen Boulevard and East Orem Street.

Based on our chain-of-ownership review and other historical information, Houston's American Home Dream Program I, Inc., is the current owner of subject property. Gulf Oil Corporation and its subsidiaries owned the Kennedy Heights property from 1921 till 1968 and utilized three 300,000 barrel capacity open pits for crude oil (two northern pits) and water (southeastern pit) storage from 1922 to 1927. These pits were located 1,000 to 1,500 feet north and east of the subject property. From 1927 till 1968 Gulf reportedly leased the property for cattle grazing. The pits appeared to have been converted for storm water control in the late 1950's or early 1960's. The eastern most pits were filled in the late 1960's or early 1970's and subsequently developed for single family residential purposes. The northwestern pit was closed prior to 1980 and remains undeveloped and wooded.

Based on a City of Houston Health Department file for Kennedy Heights, soil contamination has been encountered in the upper 10 feet in the area of the northeastern pit approximately 1,500 feet northeast of the subject property.

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No visual, olfactory, or field screening evidence of impact was noted to soils or ground water encountered during this assessment.

Total petroleum hydrocarbons, volatile and semivolatile organics, arsenic, cadmium and lead were not detected in the soil and ground-water samples analyzed. Also, chromium, mercury, selenium, and silver were not detected in the ground-water samples analyzed. Slightly elevated levels of chlorides, sulfates, and total dissolved solids were found in the shallow ground-water samples analyzed. Low levels of some metals (barium, chromium, mercury, selenium, and silver) were detected in the soil samples analyzed. Also, the soils exhibited elevated levels of pH, chlorides, and sulfates. These constituent levels may represent background levels for this area of Houston; however, the scope of work performed was not sufficient to establish background conditions.

Based on the information obtained to date, it is our opinion that the potential for environmental contamination at the subject property is low. Although, the past crude oil and water storage pits located to the north and east of the subject property are considered to be potential sources for contamination, it is our opinion that due to their locations 1000 to 1500 feet from the subject property, the clayey Lake Charles soils and Beaumont Formation sediments, and topographic gradient to the northeast towards Sims Bayou, the potential for impact to the subject property is low.

Based on the information presented in this report, we recommend that our findings from this assessment be reviewed by the City of Houston to determine whether or not our findings meet their criteria for residential development. Also, should you require a legal or regulatory opinion, we recommend that an attorney be consulted that is familiar with environmental regulations/issues in Texas. We can assist you in obtaining an official regulatory opinion or to determine background conditions, should these be necessary.

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- Performed an area reconnaissance within 1/4-mile of the property by automobile along accessible roadways to observe for potential sources of contamination which could have impacted the subject property including drive-bys of regulatory listed facilities. Abutting properties were viewed from the subject property.
- Verified the locations of regulatory listed facilities within a 1/2-mile radius of the subject site, as identified in our previous report.
- Performed an onsite limited PCB survey. The limited PCB survey consisted of a visual reconnaissance for fluid-containing major electrical devices (transformers). The limited PCB survey did not include any sampling or testing of dielectric fluids.
- Reviewed readily available records at the Texas Railroad Commission (TRRC) regarding the subject site and its immediate vicinity.
- Contacted representatives of Chevron in an effort to obtain information they had regarding the subject site and immediate site vicinity due to previous operations by Gulf Oil Corporation, particularly regarding the three pits located in the general vicinity of the subject property.
- Mr. Kendall Pickett of LAW attended a meeting on March 3, 1994, held near the southeast corner of the intersection of Cullen Boulevard and Selinsky with (b) (6) a concerned citizen, Mr. Charles L. Roosevelt with the City of Houston, Mr. Gabe Macias with the Texas Railroad Commission, and Mr. Jal Sethna, Mr. Larry Siebert and Ms. Danna Dewlen, Chevron representatives, regarding past operations in the site vicinity.
- Reviewed past documentation from the City of Houston Health Department files for Kennedy Heights. A geotechnical report prepared by Associated Testing Laboratories and data or reports of Mr. Hanby (mentioned in the February 15, 1994 Houston Chronicle article) were not available for review.

The objective of this assessment was to identify obvious, actual and potential, sources of contamination associated with the site which could have become an environmental liability. It was not the purpose of this phase of our services to determine the presence, degree, or extent of contamination at the site.

temperature, and specific conductivity began to stabilize. Subsequent to development, the wells were purged and sampled. Purging consisted of removing three to five well volumes of water to allow representative ground water to enter the wellbore prior to sampling.

### 2.2.2 Laboratory Analysis

Based on PID, olfactory, and any visual evidence of contamination, two soil samples from each of the borings, and one ground-water sample from each of the monitor wells were selected for laboratory analysis. The soil and ground-water samples were analyzed for the following constituents:

- total petroleum hydrocarbons (TPH - EPA Method 418.1; all samples),
- semi-volatile and volatile organics (1 water and 1 soil samples),
- total RCRA metals (3 water and 3 soil samples),
- chlorides, pH, and sulfates (all samples), and
- total dissolved solids (TDS; 2 water samples).

Commonly accepted procedures, materials and equipment were utilized for the field operations and sample handling. No QA/QC samples were collected or analyzed during this assessment. The samples were stored on ice in laboratory supplied containers until delivery to the laboratory, utilizing chain-of-custody procedures.

### 2.3 LIMITATIONS

Although this study has attempted to identify the potential sources of contamination for the subject property, there is always the possibility that potential sources of contamination have escaped detection due to the limitations of this study, the inaccuracy of governmental records, or the presence of undetected and unreported environmental accidents. Law Environmental reserves the right to alter our conclusions and recommendations if additional information becomes available.

Regardless of the thoroughness of an environmental site assessment, there is always the possibility that conditions between borings will be different from that at the specific boring locations due to the variability of subsurface conditions. Therefore, it was not possible to identify all conceivable

### 3.1 CURRENT OWNERSHIP

Information provided by Charter Title Company of Houston, Texas lists the current owner of record as Houston American Home Dream Program I, Inc. (As to Lots 31 and 32, Block 13), per record P 696441 corrected P 710007, dated February 2, 1994 (Appendix B).

### 3.2 PRIOR OWNERSHIP

Prior ownership was determined by reviewing chain-of-ownership information extending back to September 8, 1921. The deed search was completed by Charter Title Company through February 17, 1994.

Thirty-three title instruments and lease agreements transfer ownership or assign leases of the subject property between individuals. Gulf Production Company, Gulf Pipe Line Company, Gulf Refining Company, Gulf Oil Corporation, Log Development Company, United Acceptance Corporation, Kennedy Heights Construction Co., several mortgage companies, developers, trusts, financial institutions, and Houston's American Home Dream Program I, Inc.. The chain-of-ownership summary is provided in Appendix B. Review of the latest deed, (Number 696441), did not reveal deed-recorded information of environmental problems associated with the property.

Gulf Production Company acquired the property on September 8, 1921 from (b) (6). According to Chevron representatives, Gulf operated nearby pits between 1922 and 1927. The two northernmost pits were reportedly used to store crude oil and were constructed with a wooden roof to shelter the pits from the sun to minimize volatilization of the lighter crude fractions. The southernmost pit was unroofed and reportedly used to store water. The nature of the water is unknown; all three pits were likely constructed with wooden timbers to line the sides and bentonite clays on the bottom. The pits have been indicated to have 300,000 barrel capacities each. The wooden timbers may have been treated with creosote or other wood preservatives. In 1927, a tornado reportedly destroyed the roofs over the crude oil pits. The pits were subsequently taken out of service. It is uncertain whether the pits were filled/emptied by trucks, pipelines, or other means. In 1939, the TRRC issued an order to cease use of open pits for storage of crude oil (Appendix E). Based on the aerial photographs and topographic maps reviewed during this and the previous assessment, the pits appear to have been converted for storm water control between

The 1945 aerial photograph revealed the three pits containing liquids of similar color at different levels. The anomaly noted in the 1935 aerial photograph remains present; however, the above mentioned shed's no longer present. A trail appears to be present between the southeastern pit and the group of buildings located south of the northwestern most pit. Another rural residence appears to be present adjacent to the south of the southwest corner of the subject property, and the Orchard is still visible to the west.

The 1955 aerial photograph depicts a light colored substance in the northwestern pit and darker substance in the remaining two pits. The trail mentioned above is no longer present; however, the centrally located anomaly remains. A drive-in theater has been constructed immediately south of the southeastern pit within an access road to Cullen Boulevard. The orchard to the west is still present.

The 1969 aerial photograph shows residential development north of the northern pits and east of the eastern pits. The northeast pit has been filled. The two remaining pits appear to be connected to adjacent ditches presumably for storm water control purposes. Streets have been partially constructed adjacent and north of the northwestern pit and east of the northeastern pit. Construction appears to be beginning in the northeast portion of Kennedy Heights. Trails from this area appear to extend westerly to Cullen Boulevard. A northeast-southwest trace appears on the subject property which is probably related to the Coastal States crude pipelines which currently cross the northern portion of the subject property. A small building appears to be present on the subject property near the southwest corner. The centrally located anomaly and the orchard to the west are still visible. Commercial businesses have developed along Cullen Boulevard. The drive-in theater no longer appears active. A ditch was observed along Selinsky road, as it was in prior photographs.

#### 4.0 SITE RECONNAISSANCE

The site reconnaissance was performed on February 22, 1994, by Ms. M. Patricia Fitzgerald, a LAW professional experienced in environmental liability assessments. The subject property and area reconnaissance consisted of visual observation of the property conducted on foot and by an automobile tour along accessible roads of the area within 1/4-mile of the property. The site topographic map is shown in Figure 1. A general site plan is presented in Figure 2.

#### 4.3 AREA RECONNAISSANCE

The area reconnaissance was performed to assist in evaluating if adjacent land uses have, or could have the potential to contaminate the site. The area reconnaissance was conducted by touring the area by automobile and on foot. Figure 3 is a recent aerial photograph of the site vicinity. The site vicinity is predominately residential and vacant land with commercial establishments along Cullen Boulevard. Immediately north and east of the site are single family residences. Adjacent to the south is a wooden barn, corrals and pastures for horses, beyond which is a small city park. Approximately 700 feet south is an HL&P electrical substation. Adjacent to the west of the subject property is vacant land and Cullen Boulevard. West of Cullen Boulevard is a residential neighborhood and commercial businesses.

Rancho petroleum pipelines appear to trend east-west immediately north of the HL&P substation, parallel to East Orem.

As part of the area reconnaissance, LAW attempted to verify the locations of regulatory listed facilities within 1/2-mile of the property as identified in our previous report. Several of these facilities are identified on Figure 3. An abandoned convenience store was noted at the corner of 3900 East Orem and Seagrest. This abandoned building appeared to have been site of the Quik Snap. PST and LPST (minor soil contamination which did not require remediation action plan, final concurrence issued, case closed), listed at 3931 East Orem (Figure 3, No. 2). This facility is not considered a concern due to its distance from the subject property.

J-Food Store (Figure 3, No. 8) was noted on Cullen Boulevard approximately 1/2 mile south of the subject site. Quick Way Foods (Figure 3, No. 9), and Roberts Auto Parts (abandoned) (Figure 3, No. 10) were noted 200 feet to the west of the site on the west side of Cullen Boulevard. Safe-Way Food Mart (listed PST) is located at the northeast corner of Kennedy Heights Boulevard and Cullen Boulevard (Figure 3, No. 5). To the north along Cullen Boulevard is a Southwestern Bell Telephone garage (listed PST-Figure 3, No. 3) and Fire Station #55 (listed PST-Figure 3, No. 4).

Capital Projects contracted with Lockwood Andrews and Newman (LAN, report No. 10086 was attached to the above discussed letter) to obtain corings of soil in the northeastern portion of Kennedy Heights. These samples were later analyzed by BETZ Laboratories as well as the Health and Human Services Laboratory. Both analytical results were in general agreement and both indicated that concentrations of substances in the soil were below Texas Railroad Commission guidelines for hydrocarbons in soils. Background information described the pits as three man made ponds, approximately 4 acres in size, which were present in the Kennedy Heights Subdivision. Eventually, two of the pits were filled and the land was developed. The pits were located in the vicinity of the northeastern and southeastern corners of Kennedy Heights (Sections 1 & 2). The third pit was located near the northwestern corner of the acreage generally known as Kennedy Heights. This pit was filled and leveled and is presently undeveloped and moderately wooded.

- September 1992 notes of neighbors regarding testing to be performed.
- November 1992 special notice to the Kennedy Heights subdivision to announce Civic Club meeting regarding toxic waste dumps to be tested.
- April 28, 1993, letter from Krist, Gunn, Weller, Neumann & Morrison, L.L.P., Attorneys at Law to Ms. Helen Gros with the City of Houston Legal Department requesting copies of all soil and/or water tests performed by the TWC, or its agents, regarding the Kennedy Heights Subdivision.

The 1991 LAN report concluded that contaminated soils were encountered at depths from two to six feet below grade (study performed along Marway Road and Lockgate Street). Potential health and safety hazards existed for workers in pits or trenches in those areas. Respiratory, skin and eye protection were recommended, along with ambient air monitoring by trained environmental professionals during excavation work. These investigations were related to Sections 1 and 2 of the Kennedy Heights subdivision.

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surface in borings B-1 and B-3. A separate shallow saturated zone was encountered at a depth of approximately 11 feet in boring B-2. Soil boring B-1 was advanced at the south end of the subject property, soil boring B-2 was advanced in the northeast portion of the subject property, and soil boring B-3 was advanced in the northwest portion of the subject property as shown on Figure 2. Relatively undisturbed soil samples were obtained by forcing a clean, two-foot section of thin wall steel tubing (Shelby tube) into the soil. The soils were sampled continuously from the surface to the 10 foot depth and at five-foot intervals thereafter.

Soil samples obtained in the field were classified by our field geologist, observed for visual evidence of contamination, and field screened with an OVM model 580B photoionization detector (PID) for the presence of organic vapors. The PID was calibrated with a 100-parts per million isobutylene gas standard prior to analyzing the soil samples. Sample PID readings are presented on the Test Boring Records in Appendix C. The PID analysis is neither quantitative nor qualitative and is used only as a field screening test of the relative presence of organic vapors for the purpose of selecting samples for laboratory analysis. Low (background) PID readings were detected for the soil samples collected from the three borings. No chemical or hydrocarbon odors or staining were noted during drilling and sampling activities.

Based upon the low (background) PID readings and the lack of visual evidence of contamination, two soil samples from each boring were selected for laboratory analysis. One sample was collected from the interval above the saturated zone and one sample was collected from an interval near the surface. The selected soil samples were placed in laboratory supplied glass containers, stored on ice, and delivered to the laboratory with chain-of-custody documentation. Each soil sample was analyzed in the laboratory for TPH, chlorides, sulfates, and pH. The shallow soil sample collected near the surface of each boring was analyzed for total RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), and the shallow soil sample collected from boring B-2 was also analyzed for volatile and semi-volatile organics. Following soil sample collection, each of the soil borings (B-1, B-2, and B-3) were converted into Type II monitor wells.

## 6.2 MONITOR WELL INSTALLATION AND SAMPLING PROCEDURES

Soil borings B-1, B-2 and B-3 were converted into monitor wells MW-1, MW-2, and MW-3, respectively, on February 21, 1994. The monitor wells were constructed of 2-inch diameter.

During the above mentioned field activities, soil cuttings and purged waters were placed in closed metal drums which were labeled and left onsite near each monitor well location (Photograph No. 2). A total of eight drums of soil cutting and three drums of purged water are currently present onsite.

### 6.3 GEOLOGY AND HYDROGEOLOGY

During soil boring advancement, the general subsurface stratigraphy was dark gray clay in the upper three feet, light gray and yellowish brown clay from 3 to 6 feet, followed by reddish brown and light gray clay to approximately 27 feet. In borings B-1 and B-3 a reddish brown silt saturated with ground water was encountered below 27 feet to boring termination at approximately 33 feet. A one-foot interval of light gray sand saturated with ground water was encountered from 11 to 12 feet in boring B-2, and was followed by reddish brown and light gray clay to boring termination at 15 feet. Detailed soil descriptions, boring depths, water levels, sampling intervals, and PID readings are presented on the Test Boring Records included in Appendix C.

As previously mentioned, ground water was encountered at approximately 27 feet below the surface while advancing soil borings B-1 and B-3, and at approximately 11 feet below the surface in boring B-2. After 24-hours, the stabilized water level depths measured in monitor wells MW-1 and MW-3 were 8.27 and 8.12 feet, respectively, and the stabilized water level depth measured in monitor well MW-2 was 1.78 feet below the top of the well casing (near ground surface). Based on the geology and hydrogeology at the site, the ground water encountered in each well appears to be under confined conditions. There also appears to be a shallower interval of confined ground water in the vicinity of monitor well MW-2 that is not hydraulically connected to the deeper water interval encountered in wells MW-1 and MW-3.

### 7.0 LABORATORY ANALYSES RESULTS

The soil and ground-water samples from the three soil borings/monitor wells were submitted to Environ Express Laboratories in LaPorte, Texas. Laboratory analytical results of soil and ground-water samples are presented in Tables 1 and 2. The laboratory data sheets and chain-of-custody documentation are included in Appendix D. For consistency, the analytical results are reported and discussed in parts per million (ppm) in the text of this report.

## 7.2 GROUND-WATER SAMPLES

One ground-water sample was collected from each of the three monitor wells (MW-1, MW-2, and MW-3) for laboratory analysis. Each ground-water sample was analyzed for TPH, chloride, and total RCRA metals using the same EPA analytical methods previously mentioned: sulfate was analyzed using EPA method 4500C, and pH was analyzed using EPA method 150.1. In addition, the ground-water samples collected from monitor wells MW-1 and MW-2 were analyzed for TDS (EPA method 160.1), and the sample collected from MW-2 was also analyzed for volatile and semi-volatile organics (EPA methods 8240 and 8270).

Analytical results of the ground-water samples indicated that TPH, volatile organics, and semi-volatile organics were not detected above the laboratory detection limits. Metals were also not detected in any of the ground-water samples except for samples MW-1 and MW-3 which contained a reported concentration of 0.1 ppm barium, which is also the laboratory detection limit. Each ground-water sample contained chloride at reported concentrations ranging from 551.83 ppm to 619.81 ppm. Each of the ground-water samples also contained reported concentrations of sulfate ranging from 124.0 ppm to 1,248.2 ppm. The pH of the samples ranged from 6.97 pH units to 7.40 pH units. TDS was reported at a concentration of 1,389 ppm in MW-1 and 2,936 ppm in MW-2. Chlorides, sulfates, and TDS were highest in the shallow ground-water zone sampled in MW-2, and lowest in the deeper ground-water zone sampled in MW-1. Samples from MW-3, in the deeper ground-water zone, had slightly higher levels of chlorides, sulfates, and pH than in MW-1.

## 8.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the work performed during this assessment, our conclusions and recommendations are as follows:

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- Regulatory listed facilities consisted of several UST sites within 1/2-mile of the property. Based on our area reconnaissance two PST sites are located within 500 feet to the north of the subject property. The two nearest LPST facilities are located approximately 1/2-mile to the north and southwest of the subject property.

## 8.2 LIMITED PHASE II - FIELD SAMPLING AND LABORATORY TESTING

- The soils in this area are classified as Lake Charles clays and are underlain by Beaumont Formation sediments. These materials are typically very clayey with low permeabilities. Based on our three soil borings advanced on the subject property, the soils are predominantly clays to a depth of 27 feet where a water saturated silt was encountered. A water saturated fine sand interval of apparently limited lateral extent was encountered in one of our three borings at a depth of 11 to 12 feet.
- The shallow ground water zones sampled during this assessment are not known to be used for drinking water purposes in this area, and are not primary drinking water aquifers in Harris County. Drinking water in Harris County is primarily obtained from the Chicot and Evangeline Aquifers at depths of 500 to 1,500 feet below the surface, and from surface water reservoirs such as Lake Houston.
- The concentrations of chlorides, sulfates and TDS detected in the ground-water samples collected from both ground-water zones sampled exceed EPA secondary drinking water standards. However, it is unlikely that these zones will be utilized as a drinking water source in the future due to their low productivity, limited extent, naturally poor quality, and shallow depth (prone to near surface impacts).
- The concentrations of barium, chromium, mercury, selenium, and silver which were detected in most of the soil samples, and barium in two ground-water samples, appear to be representative of background conditions in this area.
- The United States Soil Conservation Service considers a range of 6.1 to 8.4 pH units to be typical for the Lake Charles Clay soils that are prevalent in this area. Based on the analytical results of soil samples collected during this assessment, the soil pH at the subject property exceeds this pH range (9.0 to 9.5 pH); however, based on its consistency in the samples analyzed, this may be indicative of background conditions in this area.

## REFERENCE 8

ENVIRONMENTAL INVESTIGATION  
OF SUBSURFACE HYDROCARBON CONTAMINATION

KENNEDY HEIGHTS SUBDIVISION  
HOUSTON, TEXAS

Prepared For:

O'QUINN, KERENSKY, McANINCH & LAMINACK  
HOUSTON, TEXAS

VOLUME I

October 1, 1996

Exploration Technologies, Inc.

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REP-AGO-00001

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## 1.0 INTRODUCTION

In December 1994, Exploration Technologies, Inc. (ETI) was retained by O'Quinn, Kerenky, McAnnon & Laminack (O'Quinn), attorneys representing the residents of Kennedy Heights subdivision, to investigate the nature and extent of suspected hydrocarbon contamination underlying the subdivision. Kennedy Heights subdivision (Site) is located in the southern portion of Houston (Harris County), Texas, southeast of the intersection of Selinsky Road and Cullen Boulevard (Figure 1).

ETI's initial investigation of the Kennedy Heights subdivision consisted of a review of previous assessment work performed by City of Houston environmental consultants and construction contractors, aerial photographs, and topographic maps. In January 1995, ETI conducted an initial field reconnaissance, followed by a preliminary soil vapor survey in the northeast portion (Section 1) of Kennedy Heights (Figure 2). The objective of the initial soil vapor investigation was to determine the presence and horizontal (areal) extent of hydrocarbon contamination (reported by other environmental consultants) in near surface soils and/or ground water as the result of former crude oil storage operations by Gulf Oil Corporation (Gulf) in the 1920's and subsequent site usage prior to construction of the subdivision in 1969. Gulf Oil Corporation was acquired by Chevron U.S.A. Inc. in 1985.

Additional sample collection and testing, including infill and detailed soil vapor surveys, borehole drilling/sampling and laboratory analyses were performed by ETI between January 1995 and February 1996 as part of a continuing investigation of subsurface contamination beneath the Kennedy Heights subdivision and surrounding areas. ETI was also present during testing performed by Chevron U.S.A. Inc. (Chevron) consultants between December 1995 and May 1996; split/duplicate vapor, soil and ground water samples were collected and analyzed. Field notes documenting field visits and field work/sample collection activities are included in Appendix C. Despite having the benefit of ETI's assessment data and interpretations, the testing performed by Chevron was incomplete and inadequate for confirming/defining the areal and vertical extent of the existing contamination. The testing program included questionable sampling methodologies and analyses, and an inadequate

## 2.0 QUALIFICATIONS

Exploration Technologies, Inc. (ETI), founded in 1984, possesses a wide range of capabilities to perform all phases of environmental site assessments and remediation involving natural and refined petroleum product surface and subsurface contamination. ETI's staff of geoscientists (including geologists, chemists, geochemists, physicists and engineers) have extensive experience in research, development, execution and interpretation of various geochemical techniques utilized in environmental studies, petroleum and minerals exploration. Many of the technologies and methodologies utilized by ETI are proprietary (such as our soil vapor technology) and are modified after methods developed by major oil and gas companies. These methods and technologies are recognized and accepted by the scientific community and government agencies (Coniff, 1985; Gray, et al., 1993; Rapaport, 1991; United States Environmental Protection Agency, 1990).

ETI's laboratory performs analyses in accordance with EPA methodology and other approved petroleum exploration and environmental industry protocol. All analyses are performed under stringent quality assurance/quality control (QA/QC) procedures. The laboratory has been audited by the Texas Natural Resource Conservation Commission (formerly the Texas Water Commission) and found to be in compliance with agency protocol and procedures.

I, Patrick N. Agostino, have a Ph.D. in Geology and I am a principal with Exploration Technologies, Inc. located in Houston, Texas. I have performed and/or supervised the acquisition, interpretation and mapping of field data collected at the Kennedy Heights subdivision. The conclusions and opinions included in this report are based upon my 23 years of oil and gas and environmental industry experience, educational training and literature that I have reviewed throughout my career as well as documents/literature reviewed which are specific to the Kennedy Heights project.

Appendix A includes my Curriculum Vitae (CV), a bibliography of publications, and a statement of compensation for work performed on this project. A listing of all litigation in which I have provided deposition or trial testimony is also included.

Kennedy Heights as demonstrated by the cracked streets, sidewalks and house foundations/slabs. See photographs in Appendix B. The residents as well as COH construction crews began to note odors and discoloration of near surface soils during a water main replacement project in 1991. This project was suspended by the City of Houston Environmental Health Division because the contractor, Pas-Key Construction Services, Inc. (Pas-Key), encountered petroleum contaminated soils (in addition to large appliances, auto parts and other large debris) during excavation operations in the vicinity of the northeastern former crude oil storage pit (Pit #1).

LAN conducted a limited environmental assessment of Pit #1 for the City of Houston and submitted a report in December 1991. Although a limited number of soil samples were collected and analyzed, laboratory results indicated petroleum product contamination in subsurface soils. In a letter to Pas-Key dated January 29, 1992, EFEH & Associates, Houston, Texas reported that soil samples analyzed (collected from excavations in Kennedy Heights) contained "creosote mixed with crude oil" (Appendix D). The limited Phase II environmental assessment performed by LAW in 1994 was conducted in the southwestern portion of the Kennedy Heights area. Since this area was not used for oil storage operations, it is understandable that no significant soil impact was noted. Low levels of certain metals (barium, chromium, mercury, selenium and silver), however, were detected in the limited number of soil samples analyzed.

A combination of factors prompted the residents of Kennedy Heights and the O'Quinn firm to request a detailed environmental study. These factors included prior land use, petroleum odors and contaminated soils encountered during water main repairs, levels of soil contamination detected during the various assessments, and complaints by residents that the drinking water was discolored and contained odors. The study performed by ETI confirmed the subsurface contamination detected by the previous studies, better defined the distribution and nature of contaminants present, and demonstrates the possible risk posed to residents living over the petroleum contaminants.

## 5.2 Geology

Houston (Harris County), Texas is located on formations of Pleistocene and Recent (Holocene) age sediments which gently dip to the south into the Gulf of Mexico Basin. The site is situated on Pleistocene fluvial-deltaic deposits of the Pleistocene Beaumont Formation (Figure 5). Beaumont deposits are underlain (in descending order) by the Pleistocene age Lissie and Willis formations, Pliocene age Goliad Sand, and Miocene age Fleming, Catahoula, Anahuac and Frio formations (Fisher et al., 1972). Pierce Junction Field, located two miles northwest of Kennedy Heights, produces oil and gas from the upper Miocene and Frio formations.

The Pleistocene Beaumont formation in the study area consists primarily of clays and silty clays in the shallow subsurface environment. Matrix porosity and permeability are relatively low in the native Beaumont soils, however, locally the permeability is greatly enhanced by fracturing. Figure 6 is a photograph of fractures and slickensides common in the Beaumont Formation (Soil Survey of Harris County, Texas, 1976, pg. 139).

Lithologic data in the Kennedy Heights subdivision were determined primarily from the boreholes drilled and sampled by ETI and Chevron consultants. Near surface lithologies in native Beaumont soils consist of gray to yellow-gray plastic clay to approximately 8.5 feet, yellow-gray to red-orange stiff plastic mottled clay to 29 feet, and a red-brown silty clay below 29 feet. Within the former Pit #1 area (Figure 2), the lithologies are more variable. The upper 8-10 feet of soil consists of gray to black plastic mottled clay and silty clay, containing silt and sand layering with scattered oil staining and pockets of liquid crude oil, sludge and tank bottoms. The uppermost gray soil profile of the Beaumont Formation in the area is termed Lake Charles clay by soil scientists.

Interpretation of the lithologies described in all borehole logs (Appendix E) allows for a regional depiction of the shallow subsurface stratigraphy over the site. An understanding of the three-dimensional stratigraphic framework of Kennedy Heights subdivision is essential to understanding the distribution and potential pathways of the subsurface contamination in the soils underlying the homes in and around the pit areas.

lines over the years appear to have compromised the delivery of "fresh water" to the residents.

ETI field crews have witnessed several water main leaks and repairs in the subdivision. On March 26, 1996, a water main break occurred in the right-of-way at the southwest corner of Lockgate and Crest Haven. ETI personnel collected a 40 inch long section of the cast iron pipe removed from the excavation during repair operations. Photographs of the pipe and chain of custody documentation are included in Appendices B and F, respectively. A water main break occurred in the right-of-way at (b) (6) on September 17, 1996. During excavation and repair operations by a COH crew, an ETI geologist collected contaminated soil and water samples from the excavation at a depth of approximately six feet. The soils contained visual staining and a hydrocarbon odor, liquid product (crude oil) was observed floating on the water in the excavation. Photographs showing the liquid product on water in the excavation are included in Appendix B. A video tape (DB-KH-96-132865) of the excavation, sample collection and repair operations is included in Appendix M.

## **6.0 ASSESSMENT METHODOLOGIES**

### **6.1 Soil Vapor Sampling**

Several hundred soil vapor samples were collected and analyzed by ETI between January 1995 and February 1996. The use of soil vapor surveys to evaluate the presence of hydrocarbons in subsurface sediments is an accepted assessment technology in both the exploration and environmental industries (Sokolov, 1933; Teplitz et al., 1938; Antonov, 1939; Horvitz, 1939; Yurovski, 1939; Duchscherer, 1980; Jones and Drozd, 1983; Mamin, 1988; Jones et al., in press). The literature also contains numerous papers on various collection and analytical techniques utilized by various exploration and environmental assessment companies.

The locations of soil vapor sampling sites in the study area are shown on Figure 7. Vapor samples were recorded on chain of custody logs (Appendix F) immediately following collection. A description of soil vapor collection

## 6.2 Bore Hole Drilling, Soil and Fluid Sample Collection

Between January 1995 and February 1996, twenty-eight (28) boreholes were drilled and soil core samples were collected continuously from the ground surface to total depth in the study area using ETI's direct push Maxi-Probe™ sampling system. Chevron consultants (TEG) also utilized a direct push sampling system during their testing program. Direct push sampling, over the past few years, has become the preferred sampling technique and is accepted by regulatory agencies (Texas Natural Resource Conservation Commission, 1995). The placement of ETI's boreholes was based on results of the soil vapor surveys. A description of ETI's borehole drilling and sampling methodology is included in Appendix G. Bore holes drilled by ETI, as well as those drilled by Chevron consultants in the Pit #1 area, are included on various maps (Figures 7 and 42).

The drilling of boreholes confirmed the morphology of the soil vapor constituent plumes and enabled ETI to define the vertical extent of hydrocarbon contamination and determine the depth to ground water at various locations in the study area. Each two foot soil core section was logged and described by an ETI geologist and samples were recorded on chain of custody logs (Appendix F). Bore hole logs are included in Appendix E.

Fluid samples were also collected from selected boreholes through PVC slotted casing and transferred into the appropriate glass containers. Fluid (ground water and/or liquid product) collection methodology is included in Appendix G. A video tape (DB-KH-96-132868) showing an ETI crew collecting soil core and liquid product (crude oil) samples from a borehole at (b) (6) is included in Appendix M. All samples were immediately placed on ice following collection, recorded on chain of custody logs (Appendix F) and delivered to ETI's laboratory in Houston, Texas.

Although the direct push sampling methodology utilized by TEG was sound, the borehole locations were "randomly" selected. Boreholes were not drilled at locations known to contain high contaminant concentrations, identified by ETI's testing. It is not surprising that no liquid crude oil was encountered by TEG

Tables 7 and 8, respectively. Fluorograms for soil samples analyzed are included in Appendix H.

Benzene, toluene, ethylbenzene and xylenes (BTEX) analyses of soil and ground water samples were performed in accordance with EPA Method 8020/5030 and EPA Method 8020/602, respectively. Total petroleum hydrocarbons (TPH) analyses of soils and ground water were performed in accordance with EPA Method 418.1. Results of soil analyses are included in Table 9 (BTEX) and Tables 10, 11 and 12 (TPH). Ground water analyses are shown in Table 13 (BTEX) and Table 14 (TPH).

Metals analyses were performed in accordance with EPA methodology (Table 15). Gas chromatography/mass spectrometry (GCMS) analyses were also run on selected samples to quantify volatile (EPA Method 8240) and semi-volatile (EPA Method 8270) compounds. Results of these analyses are included in Tables 16, 17 and 18. Individual laboratory reports for soil and ground water samples are included in Appendix I.

#### **6.3.4 Miscellaneous Analyses**

##### **Synchronous Fluorescence**

Synchronous fluorescence analyses were performed on soil core samples obtained from boreholes drilled by ETI and boreholes/monitor wells drilled by Chevron consultants. This technique provides an estimate of the molecular weight range of extractable aromatic hydrocarbons contained in petroleum products including crude oil (Gray et al., 1993). These analyses were utilized to screen soil samples and identify types of petroleum products present in subsurface sediments within impacted (plume) areas. Fluorograms that illustrate and define contaminated zones are included in Appendix H.

##### **High Resolution Capillary Gas Chromatography**

Selected soil, water and liquid product samples were analyzed by Worldwide Geosciences, Inc., Houston, Texas using high resolution capillary gas chromatography (GC), a modification of ASTM method D-3328. This method utilizes a methylene chloride solvent to extract various molecular weight hydrocarbons from the sample. The extract is analyzed on a capillary column

methane is generated by the biological degradation of petroleum hydrocarbons (crude oil).

It was alleged by Chevron that the high methane concentrations and associated hydrocarbon gases measured by ETI were the result of leakage from Entex natural gas lines in the subdivision (letter from Gardere et al. to TRC dated April 30, 1996). ETI field personnel collected Entex natural gas samples from a gas meter at (b) (6). One sample was analyzed using ETI's standard vapor methodology and compared to several soil vapor samples collected in the Pit #1 area. The table included in Appendix K shows that the hydrocarbon concentrations (C1-C4, C5+ and CO<sub>2</sub>) and ratios of gases present in Entex gas are quite different from concentrations/ratios in the near surface soil vapor samples. In addition, an Entex gas sample and four soil vapor samples were sent to Isotech Laboratories, Inc., Champaign, Illinois for carbon and hydrogen isotope analyses. Isotopes are different forms of the same element. Determining the ratios of carbon (<sup>13</sup>C/<sup>12</sup>C) and hydrogen (<sup>2</sup>H/<sup>1</sup>H) isotopes in hydrocarbons allows for the distinction of thermogenic and microbial (biogenic) methane and other gases (Coleman, 1994; Kaplan, 1994). The results of the isotope analyses indicate that the methane in the soil vapor samples is biogenic in origin, while the Entex gas is thermogenic. Laboratory results and isotope compositional data cross plots using classification schemes developed by Coleman (1993) and Kaplan (1994) are included in Appendix K. Delta D and delta C13 on these graphs refer to the deuterium and carbon 13 isotope ratios, respectively.

C5+ (pentane-xylenes+) hydrocarbons concentrations are elevated in areas where elevated methane concentrations were detected. The C5+ concentrations contour map (Figure 11) is similar in shape and areal extent to the Pit #1 methane concentrations map (Figure 9). C5+ concentrations in excess of 3,000 ppm are present in the area.

Ethane (Figure 12), propane and iso-butane concentrations maps exhibit similar contaminant plume configurations. The hydrocarbon constituent plumes are located in the same general areas (storage pits) as those addressed above, however, the plumes are not as continuous since these compounds are highly

large number of soil samples collected, it was not practical nor cost effective to analyze all samples using EPA methodology. Results of TPH screening analyses (Tables 7 and 8) performed by ETI, therefore, were used to select soil samples (having the higher TPH concentrations as indicated by the screening method) for EPA analysis. As shown on Figure 41, these screening analyses show an excellent correlation with EPA method analyses. Because of the larger number of samples analyzed and the excellent correlation with EPA method 418.1, these screening data were also used to generate depth interval TPH maps. Maximum TPH concentrations plume maps were constructed for various depth intervals (Pit #1) using the TPH continuous soil screening data in Tables 7 and 8. TPH plume maps are included as Figures 42-47 for the depth intervals of 0-2 feet, 2-4 feet, 4-6 feet, 6-8 feet, 8-10 feet, and 10-12 feet, respectively. A three-dimensional representation of these interval TPH plume maps is shown on Figure 48. These displays clearly demonstrate the uneven distribution (horizontally and vertically) of petroleum contamination associated with the liquid and residual crude oil left in the former storage pit (Pit #1).

Based on the results of EPA method analyses, concentrations of TPH up to 32,060 ppm (3.2 percent) in Pit #3 (TPH-GC analysis on sample from borehole SBNW2) and 29,211 ppm (2.9 percent) in Pit #1 were measured in soil core samples collected and analyzed by SASI (Chevron) and WGI, respectively. In addition, TPH concentrations up to 27,030 ppm (2.7 percent) were measured by ETI's laboratory on a sample collected from borehole OBH-19-23 in Pit #1. Despite Chevron's inadequate sampling program, TPH concentrations up to 7,797 ppm (Table 11) was measured in a sample collected from a depth of 0-2 feet in borehole SBNE-13 (drilled by Chevron consultants) on the southwest boundary of Pit #1 (Figure 49).

An isoconcentration map of the maximum EPA TPH concentrations in each borehole, utilizing ETI, Chevron (SASI) and TRC data (selected split samples were analyzed by the TRC) was constructed (Figure 49). It should be noted that the most recent assessment data collected and analyzed by Chevron were not available to ETI at the time of this report. The TPH plume (Figure 49) is similar in areal extent to that of the methane concentrations plume map (Figure 10). The source of the contamination shown on both maps is the residual crude oil and associated tank bottoms from crude oil stored in the former pit (Pit #1).

### 7.3 EPA Analyses - Fluids

Variable concentrations of BTEX, TPH, metals and PAHs were analyzed in fluid samples collected from portions of the Site. In ground water samples collected from boreholes in Pit #1, BTEX and TPH concentrations up to 234 ppb and 103.8 ppm, respectively, were measured (Tables 13 and 14). Total target PAH (primary compounds) concentrations up to 117 ppb were also detected in these samples (Table 16).

Total PAH (substituted and target) concentrations up to 16,574 ppm were analyzed by WGI in a liquid product sample collected from borehole OBH-4RR (Table 18). Photographs of a soil core section from borehole OBH-4RR showing liquid crude oil (in the core sleeve) are included in Appendix B. The liquid crude oil sample PO2, obtained from a producing oil well (Whitehead B-4) in Pierce Junction Field, was found to be a match to the liquid products recovered from OBH-4RR and OBH-19 (based on high resolution capillary GC analyses). This crude oil (PO2), obtained from a Miocene age reservoir, contained total PAH concentrations of 5,581 ppm (Table 18). Total PAH concentrations of crude oil samples PO1 and PO3, also collected from wells in Pierce Junction Field, were 16,782 ppm and 21,297 ppm, respectively.

The liquid crude oil sample collected from the excavation, adjacent to the water main at a depth of six feet, at (b) (6) was analyzed for PAH concentrations. A total PAH (substituted and target) concentration of 7,836 ppm was analyzed in this sample. Laboratory reports and chain of custody logs are included in Appendices I and F, respectively.

Total PAH concentrations for soil/sludge and liquid crude oil samples analyzed are posted and contoured on Figure 53. The PAH plume shows a similar areal extent to that of the TPH and methane plumes. A composite plume map showing methane, TPH and total PAH concentrations/plumes on selected properties is included as Plate 4.

Petroleum hydrocarbons have been dispersing vertically and laterally in near surface soils and laterally in shallow water bearing zones along preferential porous and permeable pathways. The vertical relationship of the lithologies is

## **8.0 REMEDIATION**

There has been no effort by Chevron to initiate or develop a remedial action plan for the cleanup of subsurface contamination in Kennedy Heights. Based on the data acquired and the work performed by ETI to date, there is reasonable scientific certainty that the contamination (in liquid and/or residual phase) will continue to act as the source for the continued generation of methane vapors in subsurface soils. Low permeability clays, silty clays and clayey silts underlying Kennedy Heights subdivision are very difficult, if not impossible, to remediate. It is doubtful that the contamination present in soils and shallow ground water can be adequately remediated in situ considering the contaminant levels, the nature of the subsurface soils and the structures (houses) covering the area.

## **9.0 CONCLUSIONS**


Several different assessment and analytical techniques were utilized by Exploration Technologies, Inc. (ETI) between January 1995 and May 1996 to determine the areal and vertical extent of petroleum product (crude oil, sludge and tank bottoms) contamination in subsurface soils and ground water in Kennedy Heights subdivision. The data collected by ETI was integrated with available data collected by Chevron consultants. In addition to the data, maps, documents, etc. referenced in this report, work maps, chromatograms and other backup information are included in Appendix M

Based on the results of the assessment work performed to date in the Kennedy Heights subdivision, and in addition to the assertions and opinions herein, it is concluded with reasonable scientific certainty that:

- The subsurface soils underlying Kennedy Heights subdivision are contaminated with petroleum hydrocarbons including "pockets" of liquid crude oil and, based on data acquired through prior investigations performed by City of Houston contractors, miscellaneous municipal wastes.

- The field investigations performed by Chevron lacked the sample density necessary to properly evaluate the area. The sampling program contained significant flaws in logic, planning, implementation and methodology as evidenced by selection of sampling locations and the inability to collect samples.
- The presence of crude oil, sludge and tank bottoms in the former pits is responsible for the vapor, residual, liquid and dissolved phase contamination underlying the Kennedy Heights subdivision.
- Remediation of soils underlying Kennedy Heights will require the removal of the homes and excavation of soils below homes, roads, etc.
- Chevron has not properly assessed, acknowledged the presence of former oil storage residues (crude oil), nor attempted to remediate the contaminants underlying the Kennedy Heights subdivision.

Submitted this 1st day of October, 1996  
EXPLORATION TECHNOLOGIES, INC.



Patrick N. Agostino, Ph.D.  
Vice President

## **REFERENCE 9**

# MITRE

26 May 1988  
W52-219

Ms. Lucy Sibold  
U.S. Environmental Protection Agency  
401 M Street, S.W.  
Room 2636, Mail Code WH-548A  
Washington, D.C. 20460

Dear Ms. Sibold:

Enclosed is a copy of the draft revised HRS net precipitation values for 3,245 weather stations where data were available. The data are presented by state code, station name, latitude, longitude, and net precipitation in inches. A list of state codes is also enclosed.

The net precipitation values are provided to assist the Phase II - Field Testing efforts. It is suggested that the value from the nearest weather station in a similar geographic setting be used as the net precipitation value for a site.

If there are any questions regarding this material, please contact Dave Egan at (703) 883-7866.

Sincerely,



Andrew M. Platt  
Group Leader  
Hazardous Waste Systems

AMP:DEE/hme

Enclosures

cc: Scott Parrish

DBS	STATE	NAME	LATNUM	LONGNUM	NETPREC
2641	41	MC COOK	26.30	98.23	0.3647
2642	41	FALEURRIAS	27.13	98.09	1.0903
2643	41	LAREDO NO 2	27.11	99.28	0.0233
2644	41	KINGSVILLE	27.32	97.53	1.0121
2645	41	ALICE	27.44	98.04	1.6890
2646	41	CORPUS CHRISTI WSO	27.46	97.30	1.7390
2647	41	CORPUS CHRISTI	27.48	97.24	1.6836
2648	41	ENCINAL 3 NW	28.05	99.22	0.8944
2649	41	PORT O CONNOR	28.26	96.26	7.9240
2650	41	BEEVILLE 5 NE	28.27	97.42	3.5263
2651	41	COTULIA FAA AIRPORT	28.27	99.13	0.5928
2652	41	PORT LAVACA NO 2	28.38	96.38	8.0207
2653	41	COLIAD	28.40	97.24	4.8189
2654	41	DILLEV	28.40	99.10	1.5284
2655	41	CRYSTAL CITY	28.41	99.50	0.3470
2656	41	HAJAGORDA NO 2	28.42	95.58	9.0031
2657	41	EAGLE PASS	28.42	100.29	0.2215
2658	41	PALACIOS FAA AIRPORT	28.43	96.15	9.8209
2659	41	VICTORIA WSO	28.51	96.55	5.0430
2660	41	BAY CITY WATERWORKS	28.59	95.58	9.3658
2661	41	POTEEI	29.02	98.35	2.8271
2662	41	DANFVANG 2 SE	29.03	96.11	7.1052
2663	41	ANGLETON 2 W	29.09	95.27	15.2626
2664	41	UVALDE	29.13	99.46	1.1524
2665	41	PIERCE 1 E	29.14	96.11	9.1547
2666	41	NEW GULF	29.16	95.55	8.4050
2667	41	NIXON	29.16	97.45	4.5626
2668	41	CHISUS BASIN	29.16	101.18	0.0000
2669	41	GALVESTON WSO	29.18	94.48	8.4385
2670	41	YDOKUM	29.18	97.09	5.7008
2671	41	DEL RIO WSO	29.22	100.55	0.0497
2672	41	HALLTETTSVILLE	29.27	96.56	6.6609
2673	41	SAN ANTONIO WSO	29.32	98.28	3.7339
2674	41	PRESIDIO	29.33	104.21	0.0000
2675	41	SUGAR LAND	29.37	95.38	11.0523
2676	41	FLATONIA 2 W	29.41	97.08	1.4017
2677	41	LULING	29.41	91.40	6.6844
2678	41	NEW BRAUNFELS	29.42	98.07	6.0682
2679	41	BOERNE	29.47	98.44	5.7313
2680	41	SAN MARCOS	29.53	97.57	7.1484
2681	41	PORT ARTHUR WSO	29.57	94.01	16.1905
2682	41	HOUSTON INCOMT AP	29.58	95.21	12.3027
2683	41	LIBERTY	30.03	94.49	17.2173
2684	41	BLANCO	30.06	98.25	7.9951
2685	41	BRENNHAM	30.09	96.24	11.2405
2686	41	FREDRICKSBURG	30.16	98.52	3.0630
2687	41	AUSTIN WSO	30.18	97.42	5.4840
2688	41	CONROE	30.19	95.27	14.9689
2689	41	ALPINE	30.21	103.40	0.0000
2690	41	JUNCTION	30.30	99.47	1.6214
2691	41	SONORA	30.34	100.39	0.8081
2692	41	COLLEGE STATION FAA AP	30.35	96.21	10.9214
2693	41	TAYLOR	30.35	97.24	8.7022
2694	41	MOUNT LOCKE	30.40	104.00	0.0615
2695	41	HUNTSVILLE	30.43	95.33	14.0649

## REFERENCE 10

John Hall, Chairman  
B. J. Wynne, III, Commissioner  
John E. Birdwell, Commissioner



## TEXAS WATER COMMISSION

*PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION*

July 15, 1991

Mr. Alex Zocchi  
ICF Kaiser Engineers  
1509 Main Street  
Suite 900  
Dallas, Texas 75201

Re: Texas' Wellhead Protection (WHP) Program

Dear Mr. Zocchi:

I would like to thank you for your recent inquiry on Texas' WHP Program. The program is jointly administered by the Texas Water Commission (lead agency) and the Texas Department of Health (TDH). On June 19, 1989, the State of Texas submitted its WHP program description to the Environmental Protection Agency (EPA), pursuant to Section 1428 of the Safe Drinking Water Act (SDWA), as amended in 1986. Under Section 1428, EPA is required to evaluate each State program to determine whether it is adequate to protect public water supply (PWS) wells from contaminants that may have any adverse effects on public health. On March 19, 1990, Texas' WHP Program was fully approved by EPA for the purposes of Section 1428 of the SDWA. Because the program description is approximately 300 pages long, I will be happy to provide you with highlights and requirements contained within our program description.

Designation of a restricted use area around a public drinking water well is one way of protecting underground water supplies. This area is referred to as a wellhead protection area and it is defined as the surface and subsurface area surrounding a public water well or well field through which contaminants could likely pass and eventually reach the ground water supply.

The basic concept of the program is the minimization of land use restrictions while maximizing ground water protection. To accomplish this, the Texas Water Commission (TWC) delineates WHP areas based on aquifer parameters, a five-year travel time for potential contaminants, and best professional judgement to prevent ground water contamination. The TDH reviews contingency plans for the provision of alternate water supplies in the event of contamination of the existing source. Local governments provide an inventory of all potential sources of contaminants within their WHP areas; then they implement the program. Guidance to local governments with respect to the inventory of potential contaminant sources, and other required technical assistance as needed, is provided by the TWC and the TDH.

Texas WHP Program  
July 15, 1991  
Page 2

Since Section 26.177 of the Texas Water Code requires that every city of the state having a population of 5,000 inhabitants or more establish a water pollution control and abatement program for the city which includes the inventorying and monitoring of potential contamination sources, the TWC encourages formal participation in the WHP program. Formal participation involves: 1) the TWC providing official WHP area delineations; 2) the entity conducting an inventory of all potential contaminant sources; 3) the TWC and the TDH preparing an official report which is used to brief the participating entity; 4) the entity then enacting appropriate best management practices to prohibit or control the inventoried sources which are a threat to ground water; and 5) lastly, the entity conducting a re-inventory of potential pollution sources at two to five year intervals which is provided to the state for updating purposes.

An entity which participates in the program realizes immediate benefits in that it is assured that its ground water supply is better protected from the many potential contaminant sources. As additional incentive, those PWS systems which can demonstrate a lower risk from potential contamination may be granted reduced well monitoring requirements by the TDH.

I hope this brief overview has helped you understand how our program functions. In addition, I have enclosed a list of communities currently participating in wellhead protection. Should you have any questions, please feel free to contact me at 512/371-6332.

Sincerely,



David P. Terry, M.En.  
Ground Water Section

DPT:km

Enclosure

26 002

WELLHEAD PROTECTION PROGRAM ASSESSMENT

CITY	# OF VELLS	# OF WHP AREAS	START DATE	RPT DATE
Alamo, City of	2	1	09/20/89	/ /
Alvin, City of	5	3	02/07/88	/ /
Amarillo, City of	106	0	06/07/89	/ /
Atlanta, City of	4	2	12/06/89	08/15/90
Bardwell, City of	2	1	06/06/91	/ /
Bartlett, City of	2	2	04/26/89	08/30/90
Bartonville Water Supply Corp.	4	3	09/15/89	/ /
Bay City, City of	6	5	05/04/89	08/15/90
Beaumont, City of	3	3	01/17/89	/ /
Benbrook, City of	16	10	04/02/91	/ /
Bethany Water Supply Corp	6	2	05/24/91	/ /
Bevil Oaks, City of	2	1	01/17/89	08/08/90
Brazoria, City of	3	2	01/17/89	08/30/90
Bridge City, City of	3	2	01/17/89	/ /
Bryan, City of	8	8	10/27/88	/ /
Buckholts, City of	1	1	01/17/89	08/30/90
Carrollton, City of	1	1	11/10/89	/ /
Charterwood H.O.D.	2	1	10/03/89	/ /
China, City of	3	1	01/17/89	/ /
Claude, City of	4	4	05/25/89	/ /
Clear Lake, City of	6	2	04/18/90	05/01/91
Cleveland, City of	5	3	12/01/88	/ /
Colony, The	7	4	04/22/91	/ /
Commerce, City of	7	7	04/02/91	/ /
Cumby, City of	4	1	07/05/89	08/01/90
Dear Park, City of	3	3	03/20/89	08/31/90
Del Rio, City of	4	1	10/01/86	12/01/86
Desoto, City of	1	1	05/09/91	/ /
Devins, City of	6	6	10/27/88	/ /
Dismitt, City of	13	0	06/07/89	/ /
Dumas, City of	13	13	06/07/88	12/01/88
Eagle Bluff Assoc. Inc.	2	1	05/02/89	06/30/89
El Paso, City of	137	44	11/01/89	05/01/90
Eldorado Air Force Station	2	2	03/24/89	/ /
Fayette WSC	4	4	10/10/89	08/08/90
Flo Community WSC	3	2	10/27/88	08/08/90
Fort Bliss	14	10	01/15/90	07/20/90
Friendswood, City of	6	6	12/11/89	/ /
Friona, City of	11	3	06/07/89	/ /
Frost, City of	2	1	04/02/91	/ /
Gause, City of	1	1	01/17/89	08/31/90
George West, City of	2	1	04/26/90	/ /
Grand Prairie, City of	12	12	03/01/89	/ /
Groes, City of	2	2	07/12/88	12/01/88
Gruver, City of	2	1	06/07/89	/ /
Gunter Rural Water Supply Corp	3	2	06/06/91	/ /
Haskell, City of	3	2	06/06/91	/ /
Hereford, City of	29	0	05/17/89	/ /
Hidalgo, City of	3	1	01/17/89	/ /

WELLHEAD PROTECTION PROGRAM ASSESSMENT

CITY	# OF WELLS	# OF WHP AREAS	START DATE	RPT DATE
Houston, City of	214	0	06/06/90	/ /
Hurst, City of	6	6	10/27/88	05/25/89
Irving, City of	5	5	10/27/88	01/04/91
Jacksonville, City of	5	2	09/12/89	/ /
Johnson Co. Fresh Water Dist. 1	7	3	06/06/91	/ /
Jourdanton, City of	3	3	10/27/88	/ /
Katy, City of	5	5	05/24/88	12/01/88
Keller, City of	11	6	05/09/91	/ /
Kennedale, City of	4	4	12/21/87	04/01/88
Kilgore, City of	9	9	10/27/88	/ /
Kingwood, City of	8	8	10/27/88	/ /
Kirby, City of	2	1	10/10/89	/ /
Kountze, City of	2	1	01/17/89	/ /
Kress, City of	4	2	07/19/89	/ /
Lamar I.S.D.	3	3	05/24/88	12/01/88
Lamesa, City of	8	1	10/10/89	/ /
Little Elm, Town of	8	4	04/22/91	/ /
Lubbock, City of	3	3	01/17/89	/ /
Maloy Water Supply Corporation	1	1	06/06/91	/ /
Marlow WSC	0	2	01/17/89	08/08/90
Martindale, City of	1	1	05/02/89	/ /
McLean, City of	4	4	07/12/88	12/01/88
Meeker, City of	2	1	01/17/89	/ /
Mercedes, City of	1	1	09/20/89	/ /
Middlebush, City of	2	2	05/21/91	/ /
Milano WSC	2	2	01/17/89	08/15/90
Military Highway WSC	2	2	10/10/89	/ /
Mincoia, City of	3	3	10/10/89	/ /
Mindarva WSC	2	2	01/17/89	08/08/90
Nash, City of	2	2	05/18/89	11/01/89
New Caney, City of	2	2	11/15/90	/ /
North Milan WSC	4	4	01/17/89	/ /
North Shore Water Supply Corp	2	2	05/09/91	/ /
Orange Grove, City of	2	2	10/27/88	02/01/90
Orange, City of	4	3	01/17/89	/ /
Ovilla Community System	2	1	04/22/91	/ /
Panhandle, City of	3	3	07/12/88	12/01/88
Panola, City of	2	2	01/17/89	/ /
Panther, City of	6	2	05/24/91	/ /
Perryton, City of	11	11	06/07/88	12/01/88
Pinehurst, City of	2	1	01/17/89	/ /
Pinewood, City of	2	2	01/17/89	/ /
Plainview, City of	16	1	10/27/88	/ /
Pleasanton, City of	9	9	10/27/88	/ /
Porter W.S.C.	5	5	10/23/90	/ /
Poth, City of	2	2	10/27/88	08/08/90
Quail Valley Util. Dist.	4	4	10/27/88	/ /
Queen City, City of	1	1	05/15/90	08/30/90
Quitques, City of	2	1	03/08/91	/ /

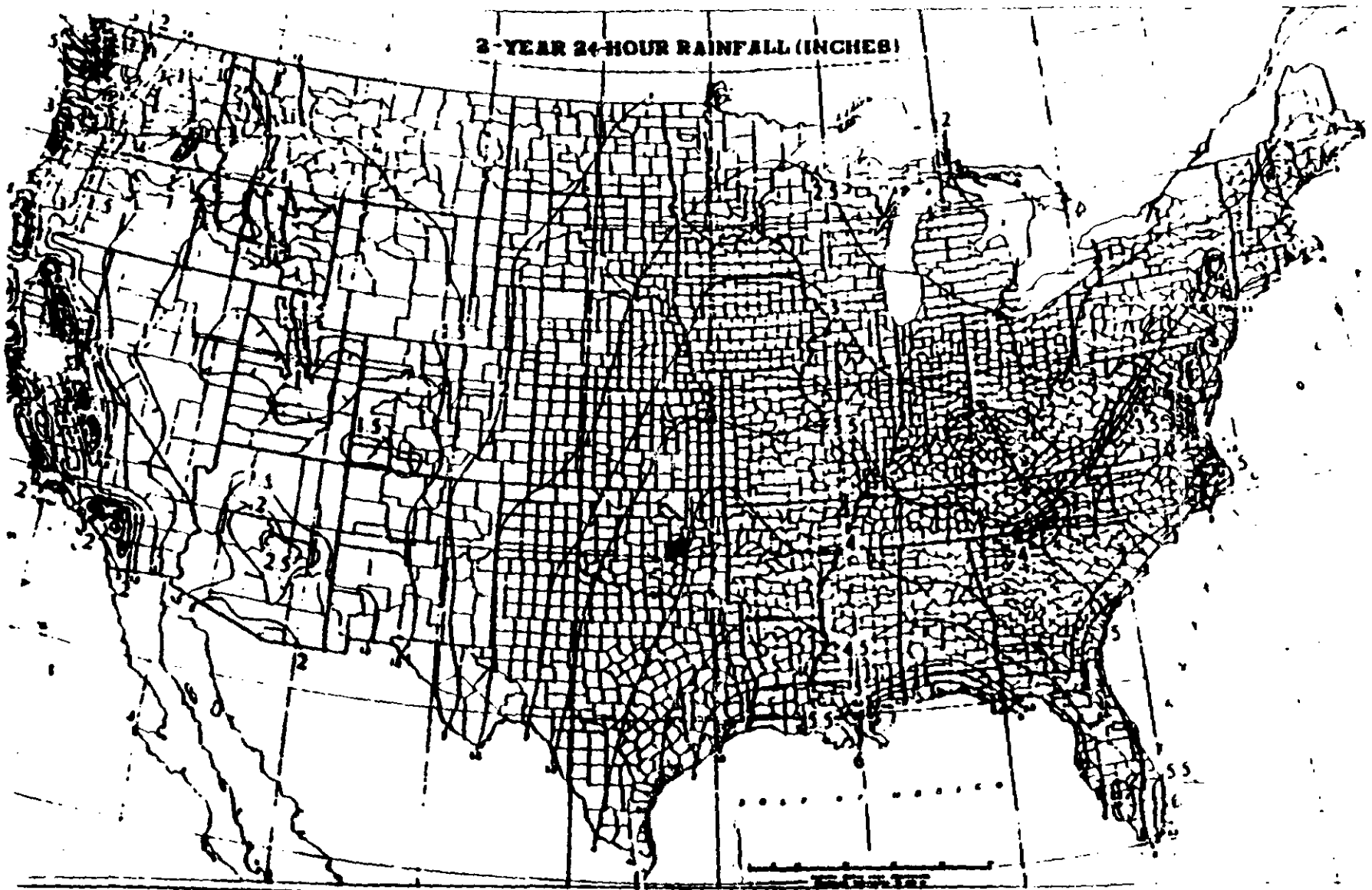
WELLHEAD PROTECTION PROGRAM ASSESSMENT

CITY	# OF WELLS	# OF VHP AREAS	START DATE	RPT DATE
Red Oak, City of	5	2	05/09/91	/ /
Redwater, City of	2	2	05/17/89	01/01/90
Refugio, City of	3	2	02/23/90	/ /
Rockdale, City of	5	5	01/17/89	08/31/90
Rocksprings, City of	2	2	10/27/88	/ /
Rosenberg, City of	5	5	05/24/88	12/01/88
Salado W.S.C.	4	1	08/23/90	/ /
San Marcos, City of	4	2	10/27/88	/ /
Shallowater, City of	7	1	04/23/90	/ /
Shenandoah, City of	2	2	10/16/90	/ /
Silsbee, City of	3	3	01/17/89	08/10/90
Sinton, City of	3	3	10/27/88	02/01/90
Skellytown, Town of	4	4	05/31/89	/ /
Smithville, City of	3	1	10/27/88	/ /
Somora, City of	5	1	12/20/89	/ /
Sour Lake, City of	2	2	01/17/89	/ /
Southwest Milan WSC	5	5	01/17/89	08/30/90
Spearman, City of	5	3	03/07/91	/ /
Stephenville, City of	29	17	04/22/91	/ /
Sterling, City of	9	4	10/27/88	/ /
Stinnett, City of	2	0	05/18/89	/ /
Sugarland, City of	7	4	01/17/89	/ /
Sweeny, City of	3	1	09/01/89	11/01/89
Tyler, City of	13	13	10/27/88	/ /
Venus, City of	2	2	04/02/91	/ /
Victoria, City of	15	12	10/15/90	/ /
Vidor, City of	3	3	01/17/89	/ /
West Orange, City of	2	1	01/17/89	/ /
White Deer, City of	3	3	07/12/88	12/01/88
Wilmer, City of	2	2	07/11/90	/ /
*** Total ***	1059	444		

## **REFERENCE 11**

Herschfield, D.M., 1961. Rainfall Frequency Atlas of the  
United States. U.S. Weather Bureau Technical Paper No. 40.

2-YEAR 24-HOUR RAINFALL (INCHES)



## **REFERENCE 12**

CURRENT POPULATION REPORTS

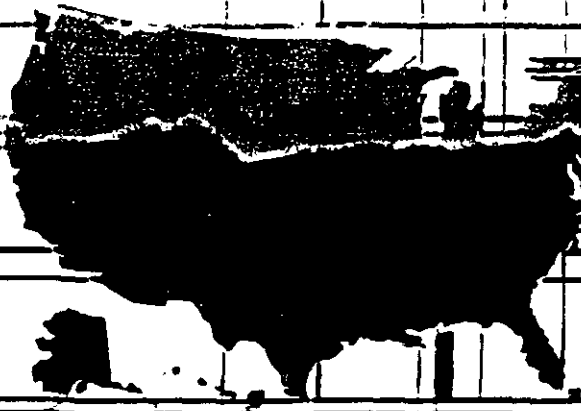
Special Studies

Series P-23, No. 165

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# Estimates of Households, for Counties: July 1, 1985

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U.S. Department of Commerce  
BUREAU OF THE CENSUS

23 001

# Estimates of Households, for Counties: July 1, 1985—Continued

0 represents zero or rounds to zero. Estimates are consistent with special censuses since 1980. Corrections to 1980 census counts are included. See text concerning rounding and average population per household.

State and county	Households				Average population per household		Population			
	July 1 1985 (estimate)	April 1 1980 (census)	Change, 1980-85		July 1, 1985 (esti- mate)	April 1, 1980 (census)	July 1, 1985 (estimate)	April 1, 1980 (census)	Change, 1980-85	
			Number	Percent					Number	Percent
Texas—Continued										
Duval	3,900	3,738	200	5.4	3.35	3.30	13,400	12,517	900	6.9
Eastland	8,000	7,730	300	3.5	2.43	2.39	20,500	19,480	1,000	5.1
Ector	46,900	40,450	3,400	15.9	2.84	2.83	134,100	115,374	18,700	16.2
Edwards	700	697	-	4.7	2.83	2.92	2,100	2,033	-	1.5
Ellis	25,000	19,866	5,100	25.6	2.90	2.94	73,700	59,743	13,900	23.3
El Paso	164,100	140,806	23,300	16.5	3.28	3.32	549,900	479,899	70,000	14.6
Erath	9,900	8,699	1,200	14.4	2.36	2.44	24,900	22,560	2,300	10.2
Falls	6,800	6,920	-100	-1.8	2.53	2.53	17,700	17,948	-300	-1.5
Fannin	9,300	9,267	100	0.8	2.54	2.53	24,500	24,285	300	1.1
Fayette	7,900	7,487	400	5.4	2.56	2.49	20,400	18,832	1,600	8.5
Fisher	2,100	2,204	-100	-4.7	2.67	2.62	5,700	5,891	-200	-2.8
Floyd	3,100	3,307	-200	-6.4	2.88	2.95	9,000	9,834	-800	-8.4
Foard	700	860	-100	-14.4	2.48	2.45	1,900	2,158	-300	-13.3
Fort Bend	57,600	39,840	17,700	44.5	3.15	3.20	186,300	130,846	55,400	42.4
Franklin	2,700	2,616	100	4.0	2.59	2.59	7,200	6,893	300	4.2
Freestone	6,400	5,608	800	14.9	2.58	2.57	17,100	14,830	2,300	15.3
Frio	4,100	4,041	100	1.6	3.48	3.37	14,400	13,785	600	4.6
Gaines	4,500	4,190	300	8.0	3.23	3.12	14,700	13,140	1,500	11.6
Galveston	77,400	59,284	2,100	11.7	2.72	2.79	214,000	196,840	18,000	9.2
Garza	1,900	1,842	100	5.3	2.80	2.87	5,500	5,325	200	3.0
Gillespie	5,200	5,219	900	18.0	2.44	2.53	15,500	13,532	1,900	14.3
Glasscock	400	387	-	-9.3	3.48	3.37	1,200	1,304	-100	-6.3
Goliad	1,900	1,777	200	9.5	2.91	2.85	5,700	5,125	500	9.0
Gonzales	6,600	5,949	600	10.2	2.78	2.78	18,700	16,883	1,800	10.8
Gray	10,500	10,224	300	3.1	2.53	2.56	26,900	26,366	600	2.1
Grayson	36,800	33,972	2,800	8.4	2.56	2.58	96,900	89,796	7,100	7.9
Gregg	41,200	35,884	5,300	14.7	2.67	2.71	112,000	99,487	12,500	12.6
Grimes	5,800	4,857	1,000	20.3	2.86	2.76	19,200	13,580	5,600	41.4
Guadalupe	19,000	15,733	3,300	21.1	2.83	2.90	55,000	46,708	8,300	17.7
Hale	12,400	12,385	100	0.5	2.91	2.97	37,000	37,592	-600	-1.5
Hall	2,000	2,175	-200	-7.2	2.36	2.34	4,800	5,594	-800	-13.5
Hamilton	3,300	3,423	-200	-4.7	2.34	2.35	7,900	8,297	-400	-4.8
Hanford	2,400	2,269	100	6.1	2.71	2.73	6,500	6,209	300	5.3
Hardenman	2,400	2,476	-100	-2.7	2.82	2.53	6,400	6,368	-	0.5
Hardin	14,700	13,727	1,000	7.2	2.89	2.96	42,800	40,721	2,100	5.2
Harris	1,035,800	889,882	166,900	19.1	2.67	2.78	2,784,000	2,409,547	374,500	15.5
Harrison	19,900	18,049	1,900	10.5	2.83	2.82	57,400	52,285	5,100	9.8
Hartley	1,300	1,381	-100	-6.4	2.73	2.67	3,800	3,987	-400	-11.0
Haskell	2,900	2,881	-100	-3.6	2.48	2.55	7,300	7,725	-500	-6.0
Hays	18,700	12,883	6,100	48.4	2.78	2.82	56,600	40,594	16,000	39.5
Hemphill	1,800	1,837	-100	-3.6	2.94	2.85	5,300	5,304	-	-0.5
Henderson	20,000	16,087	3,900	24.1	2.57	2.60	52,100	42,606	9,500	22.3
Hidalgo	99,800	75,816	23,900	31.8	3.54	3.71	358,800	283,229	72,500	25.6
Hill	10,300	9,683	900	8.9	2.52	2.52	27,300	25,024	2,200	8.9
Hockley	7,800	7,522	300	4.4	3.11	3.01	25,100	23,230	1,800	7.9
Hood	9,700	6,759	2,900	43.6	2.60	2.59	25,600	17,714	7,900	44.5
Hopkins	10,900	9,528	1,400	14.2	2.60	2.61	28,700	25,247	3,500	13.9
Houston	7,500	7,204	300	4.7	2.82	2.60	22,800	22,299	500	2.2
Howard	13,300	11,965	1,400	11.4	2.82	2.88	36,100	33,142	2,900	8.8
Hudspeth	700	822	-100	-9.9	3.41	3.30	2,500	2,728	-300	-7.0
Hunt	24,600	20,331	4,200	20.8	2.58	2.61	65,400	55,248	10,200	16.4
Hutchinson	10,200	9,837	300	3.4	2.72	2.64	27,900	26,304	1,600	6.2
Inon	700	507	200	36.8	2.82	2.73	2,000	1,386	600	41.3
Jack	2,900	2,894	-	-0.1	2.61	2.53	7,800	7,408	200	3.2
Jackson	4,600	4,685	-	-0.8	2.88	2.82	13,500	13,352	200	1.2

## **REFERENCE 13**

TELEPHONE MEMO TO THE FILE

Call To: Innocent Ohalete City of Houston Public Utilities Houston, Texas	Call From: Johnny Kennedy SSDAT, TNRCC Region 12 - Houston
Date of Call: 10/04/95	File No: TXD Pending
Phone No: 713/223-1095	Subject: Public Supply Wells
<p>Information for File:</p> <p>Mr. Innocent Ohalete, City of Houston, Public Utilities, was contacted concerning the public water supply system for the City of Houston.</p> <p>Mr. Ohalete stated that there are five active wells within the four mile radius of the Many Diversified Interest site. Two of these wells are in the Southeast Quadrant. These wells are Central Well #21 located at (b) (9) and Central Well #22, located at (b) (9). In the Northeast Quadrant there are three wells which are active. These wells are Northeast Wells 04, 05 and 06. The locations of these wells are (b) (9) respectively. One additional well, Northeast #07 is currently out of service.</p> <p>The main City of Houston water supply system supplies water to all of the downtown area, the southwest area, the southeast area and parts of the northeast and northwest areas. The total population served by the main water supply system is approximately 1.583 million people. There are other public supply systems operated by the City of Houston, however, these systems are independent of the main system.</p> <p>The city currently uses 54 percent surface water and 46 percent ground water.</p>	

210001

**REFERENCE 14**